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THE ENGINEERING AND MINING JOURNAL

VOLUME LXXXII

JULY TO DECEMBER

1906

HILL PUBLISHING COMPANY

505 Pearl Street, · NEW YORK

The Engineering and Mining Journal

VOL. LXXXII. NEW YORK, JULY 7, 1906. NO. 1.

Published Weekly at
505 PEARL STREET, NEW YORK
London Office: 20 Bucklersbury, London E. C., Eng.

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Canada, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.

To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

Copies are on sale at the news-stands of the following hotels: —Waldorf-Astoria, New York; Brown Palace, Denver; and the leading hotels in the principal cities.

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THE ENGINEERING AND MINING JOURNAL.

Entered at New York Post Office as mail matter of the second class.

During 1905 THE ENGINEERING & MINING JOURNAL *printed and circulated* 454,250 *copies, an average of* 8735 *per issue. Of this issue* 10,000 *copies are printed. None sent regularly free. No back numbers beyond current year.*

Mining in Selangor.*

BY H. HERBERT NOYES.†

A recent issue of a Straits Settlements paper contained the news that the once famous alluvial fields of Serendah, in the center of what was a few years ago one of the best known tin-mining districts in the Malay Peninsula, has been practically abandoned. This is a typical instance of the invariable custom of the Chinese to forsake stanniferous country when the shallow and easily-worked deposits of alluvial tin are approaching exhaustion. In this case it is the more remarkable as an illustration of the difficulty of working the deeper leads, which are known to exist in many parts of the State and to my certain knowledge are to be found at depths approximating 200 ft. in the valley of the Serendah river.

With the exceptions of some workings at Sungei Besi, deep lead mining has never been popular among the Chinese in Selangor, and as they hold the majority of the leaseholds where these leads exist, active prospecting has never been and is not likely to be inaugurated, unless the present price of tin may induce some more enlightened mine owner to call in expert European assistance.

The opinion of many authorities to the contrary notwithstanding, my experience has proved that the primitive mode of concentrating employed by the Chinese results in a far greater loss than is generally supposed, and without going as far as Mr. Warnford Lock, late manager of the Raub mine, who estimates the proportion saved at 60 per cent. only, I have, on many occasions, ascertained that the popular theory of 3 per cent. wastage is ridiculously inadequate and that 10 or 12 per cent. of ore escapes the *chunkals* of the Chinese coolies.

The alluvial fields of the Serendah valley differ in few respects from similar workings throughout the peninsula, except, perhaps, in the magnitude of the operations (practically the whole of the soil having been exploited) and the richness of the shallow deposits. They consist of a broad, open plain, two or three miles wide, long since denuded of jungle, bounded on the south by outlying mountain spurs of the main mountain-chain, and for the rest, broken only by a parallel range of low-lying hills, situated at the extreme end of the most payable ground. Beyond these the country is practically level to the Birnam river—the boundary between the States of Selangor and Perak—and, in a westerly direction, to the sea. By means of a small handbore I have tested most of this land, which carries stream tin in many places and usually at very shallow depths.

The richest portions of the field proper lie in close proximity to the foot-hills of the mountains and adjacent to the spot where the Serendah river debouches from between two jungle-covered hills. Here the stream has been diverted several score of times, and the ground worked to the true granite bottom; but so steep is the dip in the *kong* that shafts sunk a few yards further in the open country have only succeeded in reaching a stratum of kaolin, which may or may not be the cap of the granite decomposed *in situ*. It is probable that the decomposed clay stratum described as *kong* does not, in this instance, represent bed-rock, but is merely a layer of material derived from the shale or sandstone series at some locality other than its present resting place. Instances where the Chinese have been deceived by the appearance of this false bottom are many.

Six hundred yards from the stream and contiguous to the Serendah-Ulu Yam cart-road, a series of shafts were sunk in 1899, and secondary beds of alluvial wash worked to a depth of 120 ft., at which level the *taukeh*, a fairly intelligent Chinese, proposed to abandon the workings owing to the tremendous influx of water and the expense of pumping. I persuaded him to concentrate his labor on four shafts, in two of which 3-in. pulsometers were installed, and the following month I again visited the mine. The main shaft was down 200 ft., and at the bottom a small chamber had been excavated; though no bed-rock had been touched, the walls of the chamber showed 5 ft. of wash dirt, exceptionally rich. Seeing that the workings were unsafe, I stopped operations, and they have never been resumed.

Arguing by analogy, it may be assumed that other Chinese are aware of similar deep leads in other portions of the State; certainly they make no secret of the objections they advance against working them. Chief among these is their disinclination to attempt to prove them in the old-fashioned method, by sinking.

Next in order of obstacles is the partiality of the *taukehs*, or capitalists, for anything but *chabut* labor, i. e., the system of dividing the risk of opening up a problematical mine, with their coolies, on the small wage, but profit-sharing, co-operative principle. Deep leads do not appeal to the coolie, unable, in most cases, to understand what lies beyond the light of day, and the *taukehs* do not regard with favor the prospect of paying wages-men (*kon-si-kong*) for an indefinite period.

Lastly—and it is a factor which must be known to be appreciated—the superstition of the Chinese is alone of sufficient magnitude to deter them from engaging in this description of mining with an open mind. Because it is proved by means of a bore that payable ore exists at a certain depth to-day, it does not necessarily follow, to his way of thinking, that it will be there to-morrow. Even a Straits born Chinese, speaking English perfectly, could not be dissuaded from the belief, among others, that *amung*, or pyrites, could change into tin in a single day.

The moral is that the deep leads of the Malay Peninsula will sooner or later have to be negotiated by European management. To expect that the Chinese are capable of doing so, in the face of some of the difficulties I have indicated, would be asking too much of that industrious, if somewhat incomprehensible, race.

* Abstract of an article in the London *Mining Journal*, May 26, 1906.

† Late Inspector of Mines, Selangor, Federated Malay States.

Gold Production at Bendigo.

At Bendigo, Victoria, the returns for March were 23,590 oz. of gold. For the quarter ended on March 31 the yield was 61,318 oz., as against 45,856 oz. for the corresponding three months of last year. This is the greatest return for the first quarter since 1876. The dividends for the quarter aggregated £75,548, which shows a great increase as compared with the dividends for the corresponding three months of last year. The following statement is interesting: For 1906—Gold, 61,318 oz.; dividends, £75,548; calls, £44,480; surplus, £31,068. For 1905—Gold, 45,857 oz.; dividends, £50,821; calls, £34,303; surplus, £16,518.

Railway and Mining Development in Bolivia.

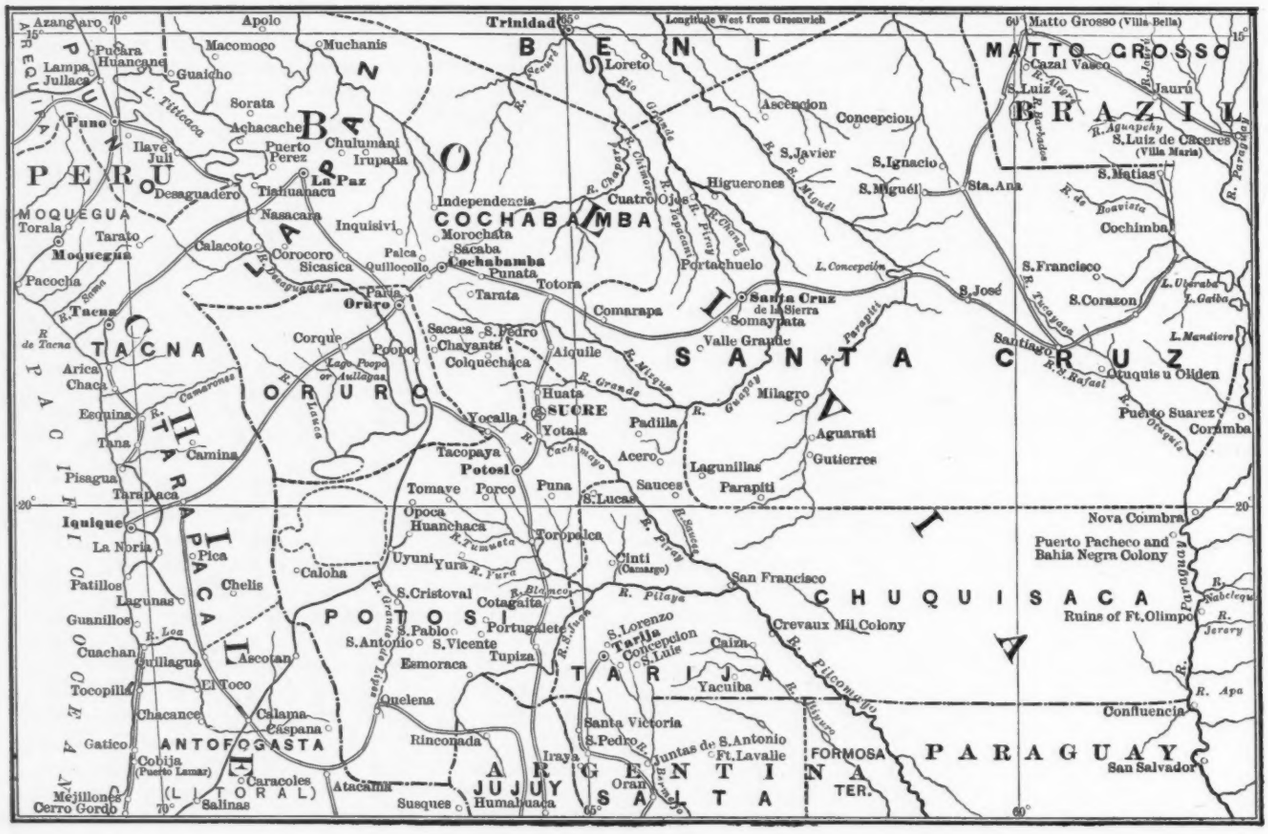
Among the countries of South America, which are now attracting especial attention, Bolivia is particularly in the public eye because of the prospect that the long isolation, which has retarded the development of its rich mineral resources, will soon be terminated by the construction of a railway system. Further interest is lent to this advance by the fact that the construction is to be done largely by American capital. Speyer & Co., of New York, will furnish a little more than half of the nearly $27,000,000 required for the work. The rest will be supplied by the Bolivian Government. The nucleus of the investment of the Bolivian Government in this development is the fund of about $10,000,000, which Bolivia obtained from Brazil in 1903, in consideration of surrendering her claim to the Acre district.

By international agreement Argentina is already extending her Northern Central Railway across the Bolivian border to Tupiza. The system for which the Speyer contract has been signed will connect Buenos Ayres, via Tupiza, with Potosi, Uyuni, Sucre, Oruro and La Paz, from which points branch lines will run into the most productive districts of Bolivia. Last March the Chilean Government authorized a loan of $12,500,000, to be placed in Germany, for the construction of a line from the port of Arica to La Paz. The completion of these lines will give Bolivia outlets to both east and west coasts, with local lines as feeders. One of the latter will run northward from La Paz to Puerto Pando, where water connection, via River Beni, will be made with the Amazon, and thus a third outlet established. A fourth outlet will be made by connecting La Paz and Oruro, the present terminal of a 30-in. gage line from Antofagasta, on the Chilean coast, 575 miles from Oruro. A fifth outlet is the present route from La Paz to Lake Titicaca, by steamer across the lake to Puno and by rail to the Peruvian port of Mollendo. However. this route is awkward, and moreover Mollendo is one of the worst harbors on the west coast.

The population of Bolivia is about 1,800,000. About one-half are native Indians, and only 12 per cent. are classed as whites. The character and physique of these people are well known to those who have had experience in South American countries. Isolated as Bolivia has been, there has been little incentive to industry and progress.

However, there is no question that, given railway facilities, Bolivia will become a great mining country. Gold is there. Silver mining is already an important industry, but it is believed to be capable of much further expansion. The famous silver mines at Potosi were discovered in 1545, and are said to have yielded upward of two billion ounces of silver. The tin mines of the country are undoubtedly destined to become one of the world's chief sources of supply. Already the Bolivians aspire to the premier place in tin production. The conditions under which this metal is found show wide differences, but it is found throughout a large area, and it is undoubtedly abundant; however, machinery and railways are necessary for its extraction and shipment. Copper mining presents important possibilities, and so do bismuth and borax. Coal and petroleum are also found, but their commercial value has not yet been determined.

The results of the new railway development should be of much importance to the United States. It is to be hoped that the lines will be built and equipped with American material. When the Panama Canal is completed we shall have direct communication with the country. In anticipation of this progress we believe that American mining men will be quick to investigate the mineral resources of this little known country. Indeed, we hear of scouting parties that have already been despatched thither.



SOUTHERN BOLIVIA.

A rich strike has been made in the Mina Vieja at Santa Eulalia. The ore is said to run about 480 oz. silver to the ton. The deposit is said to be over 100 ft. long and 40 ft. wide, and is estimated to contain 60,000 tons. The mine is owned by the American Smelting and Refining Company.

The Sudbury Nickel Region.

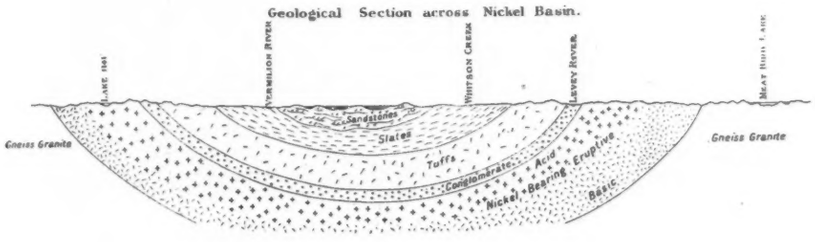
BY PHILLIPS THOMPSON.

Part III of the Report of the Ontario Bureau of Mines for 1905 consists of a long and carefully prepared report on the Sudbury nickel region, by Dr. A. P. Coleman. This brings up to the present time our knowledge of the ore deposits of this most interesting and important geological area.

This work embodies the results of investigations carried on by Dr. Coleman during the last three years, with the object of determining in detail the boundaries of the nickel-bearing rock of the Sudbury region, and examining the geological relationships of the known orebodies. The writer has availed himself largely of the work of previous investigators in the same field, with the object of presenting all the information attainable as to the geology of the region, its valuable mineral deposits and the growth and present condition of the mining and metallurgical industry. The researches of Dr. Coleman have brought out more strikingly the unique character of the area. It has been proved that all the ore deposits of any economic importance are at, or near, the outer margin of a huge laccolithic sheet of eruptive rock 1¼ miles thick, 36 miles long and 17 miles wide, in the form of a boat-shaped syncline, with its pointed end to the southwest and its square end to the northeast. The rock composing this sheet is norite at the outer —and lower—edge, merging into granite or grano-diorite at the inner or upper, edge. The orebodies are round the margin of the norite, or along dike-like offsets from it, and have evidently been segregated from the rock while still molten, though they may have undergone later re-arrangement by circulating water. There is reason to believe that the ore accumulated at the edges of the eruptive sheet, while it was still sufficiently fluid to permit the segregation and sinking of the heavier ingredients, probably in part under the action of gravitation; though at a later time there was in many cases a considerable amount of water action. While special attention was paid to the eruptive sheet and its orebodies, the adjoining rocks were carefully studied. It was found that the laccolithic sheet rests on ancient, mainly crystalline, rocks, hitherto classed as Laurentian and Huronian, while the upper surface underlies a series of later rocks.

Though it is customary to speak of two nickel ranges—the main or southern range and the northern range—the investigation has shown that really there is only one, which is continuous with the outer edge of the sheet of nickel-bearing rock. In a modified sense, however, the distinction may still be maintained, as the extreme east and the extreme west of the laccolithic sheet have not yet disclosed any orebodies of importance. So far as known, there are more numerous and larger orebodies on the southern than on the northern range, though there is great irregularity in this respect on both.

The Sudbury ore deposits have been variously described as veins, stockwerk, or lenses, and while there are examples that suggest all of these forms, none of them is characteristic. Vein-like deposits, with continuous well-defined walls reaching for any distance are unknown. The brecciated rock inclosed in ore, and the various seams of ore projecting into the country rock found at many mines, such as the Mount Nickel and Blezard, have some of the features of a stockwerk, but this arrangement is not the most prominent feature, since it often passes into solid ore with hardly any rock at the larger mines. The term lens is wholly inappropriate, and it is hard to suggest a good general term for the deposits. Two or three types of deposit seem fairly distinct. The marginal deposits are irregular sheets of ore, penetrating slightly and enveloping fragments of the foot-wall, and fading out on the hanging side into norite with too little ore to be workable. They always dip inward towards the axis of the syncline, and may have any thickness from a few feet of solid ore with a corresponding thickness of mixed ore and rock, to 200 ft. of pure and mixed ore in all. The length is equally variable, but usually several times the thickness; in the case of the Creighton mine reaching several hundred feet. How deep the orebodies go on the incline is unknown since the deepest workings are not below 172 ft., though diamond drilling proves that the Creighton ore occurs at a depth of 400 ft. The Creighton mine, which is of the marginal deposit type, has already produced probably half a million tons of ore and is supposed, from the results of diamond drilling, to have millions of tons in reserve.



Offset deposits occur on dike-like projections from the basic edge of the norite, and the type may be considered to include isolated orebodies on small outcrops of norite, representing the continuation of the offset after a short interruption. The offset orebodies are as irregular in form as the marginal ones, but do not often show the one-sided arrangement forced on the others, because of their position between the overlying norite and the underlying country rock. They are frequently rudely cylindrical or oval, with an elongation in the direction of the offset; and where the latter is narrow, they may, in places, fill almost the whole width to the exclusion of the norite. The best-known mine of this type is the Copper Cliff, where an irregularly oval body of ore, split in the lower part by a horse, has been followed down 1000 ft., with an average width of 50 to 90 ft. in one direction, and 75 to 200 ft. in the opposite one. The cylinder dips at an angle of 77½ deg. toward the northeast. In a general way, the offset deposits show the same mingling of ore and rock observed in the marginal deposits, fragments of country rock of all sizes being enclosed in ore and intimate mixtures of ore and norite occurring. There are, however, more evidences of the action of water.

There should perhaps be a third type of ore deposit defined, in which little or no norite is found, and so much evidence of pneumatolytic action is observable, that its formation should be considered due almost entirely to the action of water. This division might include the Vermilion mine and possibly some others in the same locality.

The rock always found associated with the nickel deposits is found to be norite whenever fresh, but often weathered so as to have the composition of diorite. The average width of the southern side of the eruptive band is 3.1 miles and of the northern side 1.9 miles; the total average width being 25 miles. Roughly speaking, orebodies are more numerous and larger where the eruptive is wide, and less numerous, or altogether absent, where it is narrow. The whole area of the boat-shaped eruptive sheet, covered as well as exposed is 495 square miles. The inward dip of the contact between the orebodies—or the basic edge of the eruptive when ore is absent—with the underlying Huronian or Lawrentian rocks runs from 20 to 64 deg., and the average dip may be estimated between 30 and 45 deg. As the inward dip of the overlying sediments averages about 30 deg., this may be taken as the true average dip of the whole series of rocks. On this basis the eruptive sheet has an average thickness of 1.25 miles, and if this is retained in the parts hidden beneath the sediment, the total volume of the sheet may be estimated at nearly 600 cubic miles.

The ores of the district are extraordinarily uniform, three sulphides only mak-

ing up practically the whole of most of the orebodies. Only two of these, as a rule, present themselves to the eye, pyrrhotite, or magnetic pyrite, and chalcopyrite, or copper pyrite. The third one, pentlandite, is commonly invisible in the ore, except at a few of the richer mines, where it appears occasionally. The mineral present in the largest amount is pyrrhotite, distinguished by its magnetic properties from other sulphides. Owing to its possessing this quality, attempts have been made to locate hidden orebodies by the dip needle, and by more delicate magnetic appliances; but so far no important results have been obtained by this method. Though chalcopyrite is generally present in much less quantity than the pyrrhotite, occasionally it may form the larger proportion of the ore. The two commonly occur together, but do not appear to be minutely intermixed as a rule.

The pure pyrrhotite of the Sudbury region contains, on an average, about 3.21 per cent. of nickel and the pure copper pyrite 34.5 per cent. of copper. Since the ores of the district produce about equal quantities of the two metals, the proportions of the two minerals in the ore must be about 10 parts of pyrrhotite to one of chalcopyrite. The variations in the proportions of the minerals in the same orebody are sometimes wide, as at Copper Cliff where the percentage obtained in different years presents such differences as 4.65 per cent. copper to 4.40 nickel at one time and 7.81 per cent. copper to 2.37 nickel at another.

Pentlandite, a rich ore of nickel, sometimes containing 35 per cent. or more of the metal, is not easily distinguished from the pyrrhotite (in which it is embedded) in fresh ore, the main difference being its rather perfect octahedral cleavage. It has not been found in a number of the mines, probably owing to its being too finely disseminated, but at the Creighton, Northington, Evans and other deposits, it sometimes occurs with cleavages half an inch wide. Experiments lead to the conclusion that most, if not all, of the nickel is contained in pentlandite, and that pure pyrrhotite would be found to contain little or no nickel.

The report gives detailed descriptions of the mines and deposits of the region and the latter portion gives a full account of the growth and present condition of the nickel-mining and refining industry, comprising some interesting details not previously published. The numerous illustrations include plans of the leading mines, showing both the surface and interior workings.

Nova Scotia Coal.

The report of the Department of Mines of Nova Scotia gives some particulars as to the production of coal in that Province for the fiscal year ended Sept. 30, 1905. Coal sales for that year showed a slight falling off—69,325 tons, or 1.5 per cent.—as compared with the preceding year.

The total coal mined and the disposition made of it were as follows, in long tons:

	Tons.	Per Ct.
Sales and shipments	4,475,284	88.6
Sold to employers	71,303	1.4
Used at collieries	355,543	7.1
Added to stocks	148,290	2.9
Total mined	5,050,420	100.0

Of the coal sold, 3,631,239 tons went to points in Canada, as follows: Nova Scotia, 1,651,735; Quebec, 1,492,399; New Brunswick, 411,969; Prince Edward Island, 75,136 tons. There were 138,120 tons shipped to Newfoundland. The remaining 705,925 tons were exported to foreign countries, as follows: United States, 652,538; West Indies, 2524; other countries, 50,863 tons.

The number of persons employed and the number of days worked are reported as follows:

	Employees.	Days Worked.
Underground	8,162	2,048,329
Surface	2,550	676,572
Construction	68	18,627
Total	10,780	2,743,528

The average coal mined for the year was 619 tons for each underground worker; or 469 tons per employee of all classes. The average coal per day's work was 1.84 tons. There were 812 horses employed at the mines, 626 of them underground.

Deaths and injuries to employees at the coal mines during the year are reported as follows:

	Killed.	Injured.	Total.
Number	20	74	94
Per 1000 employees	1.86	6.86	8.72
Per 1000 days work	0.007	0.027	0.034

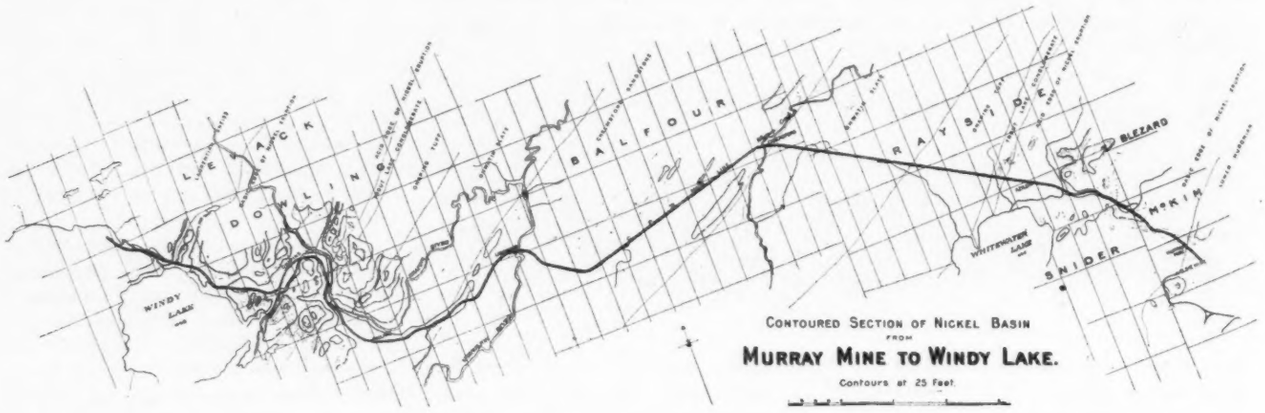
There was no important accident during the year; that is no one accident involving a considerable number of casualties.

Records have been kept of the sales of coal in Nova Scotia for 120 years. The statement is as follows, by 10-year periods, except for the first and last five years:

1785–1790	14,349	1851–1860	2,399,319
1791–1800	51,048	1861–1870	4,937,339
1801–1810	70,452	1871–1880	7,317,430
1811–1820	91,527	1881–1890	13,910,136
1821–1830	140,820	1891–1900	20,552,526
1831–1840	839,954	1901–1905	20,658,948
1841–1850	1,533,793		

The great growth has been in recent years. For the five years 1901-1905 the sales were slightly in excess of the 10 years preceding, 1891—1900. This was the result chiefly of the opening of several large collieries on Cape Breton.

The coke made in 1905 was 367,778 tons; an increase of 132,620 tons, or 56.4 per cent., over 1904. This coke is chiefly made from Cape Breton coal by the Dominion Iron and Steel Company.



CONTOURED SECTION OF NICKEL BASIN FROM MURRAY MINE TO WINDY LAKE.

Contours at 25 Feet

Abrasive Materials.

The aggregate value of the production of the natural abrasive materials in the United States during 1905, as reported by Joseph Hyde Pratt for the United States Geological Survey, was $1,427,780, an increase of $20,679, as compared with the value of the 1904 production. This includes oilstones and scythestones at $244,346, grindstones and pulpstones at $777,606, buhrstones and millstones at $37,974, pumice at $5,540, infusorial earth and tripoli, at $64,637, crystalline quartz, including a little feldspar used for abrasive, at $88,118, garnet at $148,095, and corundum and emery at $61,464.

The plant of the Helsingborg copper works, Sweden, is being extended, which will enable it to make an annual production of 5000 metric tons of copper.

The Cobalt Mining District.

BY W. M. COURTIS.*

Cobalt, Ont., the heart of the Timiskaming mining district, is attracting interest on account of the richness of the ore (from $1000 to $10,000 per ton); the great masses of native silver that have been taken out, of several hundred pounds weight; the large percentage of cobalt found in the ore; and on account of the large production in two years' life of the camp, from mines that are only pits, or are worked with a builder's derrick. Neither has its fame been hid under a bushel; its name has, unfortunately, been spread abroad by cheap promoters. With borrowed specimens and marvelous stories they often swindle the public with worthless claims.

LOOKING NORTH TO TIMMINS OR LA ROSE MINE.

Out of over 3000 claims, there are only 80 that have passed inspection; among these, only 18 shipped ores last winter. However, when the fact is known that five carloads of ore shipped a few months ago carried $300,000 of value, there is some foundation for the interest. All the mines are not found yet; every few days adds some new mine to the list.

The map shows how easily the camp is reached from Toronto, Buffalo or Detroit. The distance from Toronto is about 350 miles. Leaving there at midnight, Cobalt or Haileybury (the hotel-town five miles distant) are reached at 4 o'clock the next day. The large hotel at Cobalt is now finished, but Haileybury has two hotels, and more are building. The latter is an old lumbermen's town, prettily situated on the shore of Lake Timiskaming.

This is a picturesque mining country, with wooded hills rising a few hundred feet above the numerous lakes. Game is plenty, but is fast being driven back by continuous blasting. Hemlock, birch and some pine form the forests. Several good water-powers are found in the country. The town of Cobalt is a little over 900 ft. and the highest hills are about 1500 ft. above sea-level.

The rocks of the country are metamorphic Huronian, the lower series of which seems the most favorable for rich veins. The country has been cut by post-Cambrian greenstone dikes, largely diabase. These dikes have made overflows that form the high hills above the older bedded strata. The veins follow the trend of these flows, or cut them at right-angles.

The country is much broken, and short faults have been found in the mines. Every bluff is cut by a network of veins in three main directions; one of these is a little west of north and east of south. The water-ways of the country follow this course and it seems to be the direction of the main fractures. These veins are usually the best. The next best direction is the northeast to southwest; these veins carry smaltite, native silver in large masses, argentite, ruby silver, or other rich ores.

The best surface indication is the cobalt bloom which stains the rocks with its beautiful pink color. This is far spread even where no silver has been found. In fact, the smaltite from the rich mines would not carry much silver if all the native silver were removed.

The north-and-south veins, together with their east-and-west spurs, are the richest silver-bearing leads. They are distinguished by the "pink calcite" (which is a semi-rhodocrosite or manganese spar). In these are the richest silver ores, with nickel, cobalt and bismuth but little gold. Where they are accompanied by a dike the chances of permanency are the best; and even if temporarily faulted, the indications are that the faults will be short. Even if the veins should be scattered into stringers (as they may be in a hard belt of ground) probably in 100 or 200 ft., these stringers will unite again in the footwall and form a productive vein, if the wall rocks are congenial.

Figuring gold at full value, silver at 60c. per oz., nickel at 40c. per lb., cobalt at 70c. per lb., and arsenic at 3c. per lb., a typical ore of the smaltite class yields: Gold, $3.10; silver, $16.70; nickel, $76.70; cobalt, $257.60; arsenic, $21.36; total, $375.36. The rich native-silver ore runs from $1500 to $4000, or much higher. The richest assay in gold known to me is $51.67 per ton.

LOOKING WESTWARD SHOWING THE NEW BANK.

The third system comprises the east-and-west veins. These are characterized by copper pyrite, dolomite spar, either en-

*Mining Engineer, Detroit, Mich.

tirely free from silver and gold, or sometimes carrying a little, and copper enough to make a $10 ore. The seams vary from a quarter of an inch to several inches. Most of the worthless locations carry nothing but these seams. There is neither cobalt nor silver to be expected in developing this system. The smaltite in the northeast veins (like the Hoskins, Wilson and others) seems to carry little or no silver; what they may lead to in depth, has so far not been proved, but so long as this mineral is found, there are hopes of reaching rich silver ores.

The gangue is dolomitic calcite; yellow or white calcite (sometimes brownish pink) may be mistaken for the good variety.

Lead-bearing veins seem to run northeast and southwest; they carry white calcite and a little galena on the outcrops. Where opened up, they have sometimes had the rich silver ore, like native silver, massive argentite and ruby, with galena, pyrite, etc., but no cobalt or nickel.

Large specimens of argentite finely crystallized have been found in some of the calcite veins. Smaltite free from native silver, usually carries little silver; the highest assay was 64 oz. When it contains native silver its value will run up to $4000 a ton or more.

With the exception of a few properties like the Greene and Hoskins (in 14 and Bucke 15), and possibly a few others, the silver values are confined to that part of Coleman covered by the map, a district not exceeding three miles square. But the formation is extensive, and cobalt ores are found in similar veins throughout a district twenty-five miles square; hence it is probable that other good mines will be developed. The trouble is that the rock is hard, the veins are nothing but stringers and the claims are mostly in the hands of promoters who are looking to make sales rather than risk development. There is, however, a great field to the northwest for prospectors with nerve and some money; for prospecting is slow work in this country of many lakes, rivers and high-wooded hills..

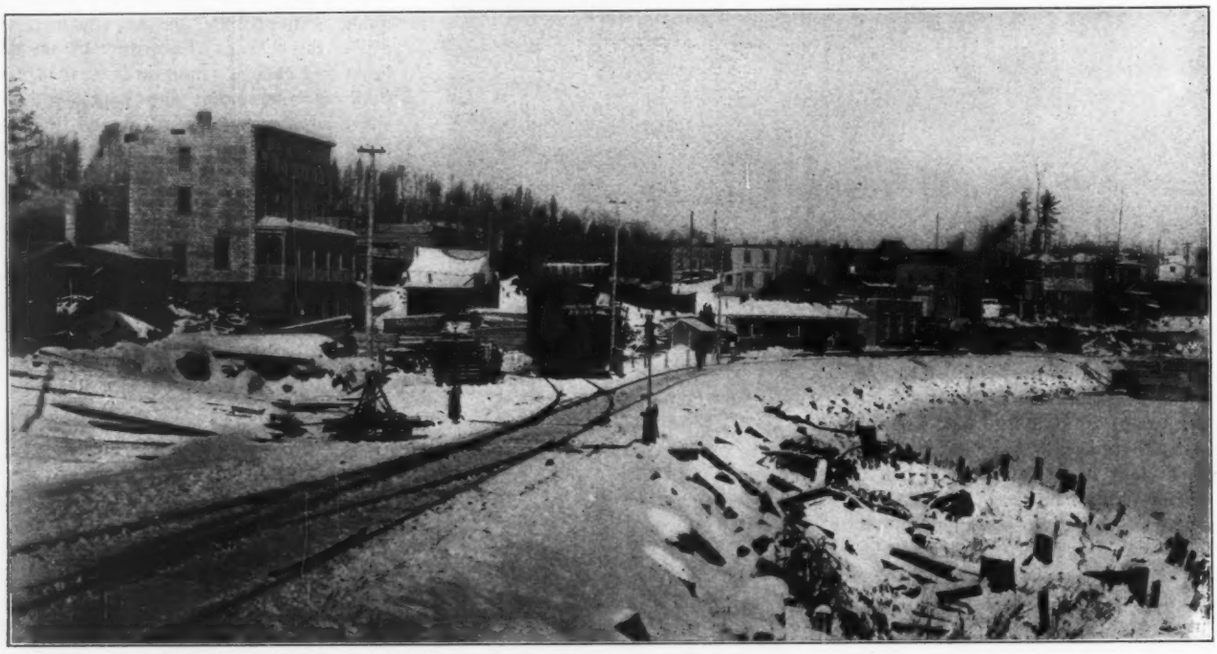
Many of the claims will take a large amount of money to explore, for the ground is hard; $25 per ft. is the average price for sinking a shaft, and $23 per ft. has been the cost of drifting.

The pink calcite (colored by manganese) was a characteristic of the famous Silver Islet off Thunder cape on the north shore of Lake Superior, which produced three or four millions in a few years. If it had not been closed down by a misfortune (the supply of coal did not arrive before navigation closed, so the mine filled with water), it might still be producing. A peculiarity of this deposit was that silver was found only where at least one wall was formed by the graphite-bearing greenstone dike; this dipped to the south, carrying the silver values with it. It seems that the history of this mine is being repeated at Cobalt. The same spar occurs, and the silver is associated with nickel and cobalt, though here the cobalt exceeds. A fine quality of graphite is found in this field, but as yet no connection is apparent between the carbon-bearing rocks and the silver deposits.

Much has been said about the difficulty of separating the silver from these ores; this has been exaggerated. Thousands of dollars worth of cobalt and nickel were separated at the Silver Islet smelting works and freed from silver in a simple manner. But at Timiskaming, the quantity of by-product has been so small that it has been better to ship the mattes to Germany than to accumulate them for home treatment.

Large prices are asked for any claim that shows merely good indications, but from which silver assays have been obtained. If near the center of Coleman, perhaps $20,000 may be the price. But $1500 to $6000 is often asked for a claim when the holder, with no real discovery, has nerve enough to ask for inspection, hoping to sell before the inspector comes and declares the property open again for want of a valid discovery. It is not safe to buy claims until they have been approved by the inspectors.

In the productive field of Cobalt all the values are coming from a small quadrangle four miles square. While there are a few good prospects like the Greene mine (in 14 Bucke), the Hoskins (in 15 Bucke), the Wilson on the Montreal river, and the Columbus mine (in 2 Coleman), no other property has come to special notice. The latter mine is noted for its fine specimens of cobaltite; smaltite is the cobalt ore of the other mines. The shipping mines are as follows: Nipissing Mining Company; Timmins; Trethewey; O. Brien; Buffalo; Darrough; Timiskaming and Hudson Bay; Foster; Glendenning; Lawson's; Jacob's; Drummond; Hargraves; Hanson's; Violet; Savage; Knight's; Watt's; and a new one, reported but not named.



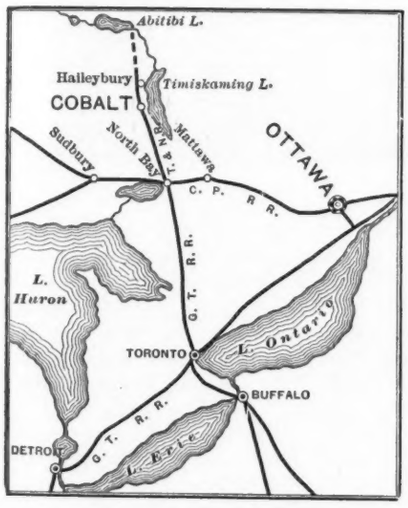
COBALT OF TODAY, VIEW FROM THE SOUTH END.

The iron and steel production of Sweden during the first quarter of 1906 included 153,300 tons of pig iron, 19,900 tons of bessemer ingots, and 76,400 tons of open-hearth ingots.

Talc and Soapstone in 1905.

Talc is found in nearly every State along the Atlantic slope. It varies from pure, foliated talc to harder steatite. Many of the compact varieties of talc and soapstone in this section of the country have been profitably worked. In the western States talc has been found in greater or less quantity at many localities, but on account of lack of transportation only a few of the deposits have been developed. The total production of talc and soapstone of all varieties in 1905, according to a report by the United States Geological Survey, amounted to 96,634 short tons, valued at $1,082,062. This was an increase of 5,445 short tons in quantity and of $141,331 in value, as compared with the production of 1904.

The increased production of 1905 is due to Virginia and Vermont. Other States



COBALT RAILWAY CONNECTIONS.

that have produced talc or soapstone are California, Connecticut, Georgia, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina and Pennsylvania.

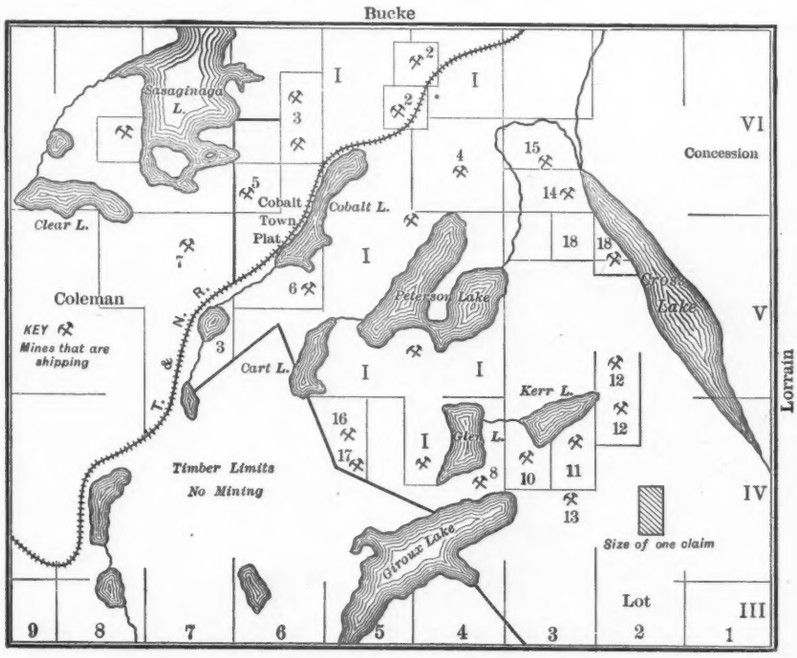
By far the most important producer of talc in the United States is the State of New York. Its output amounts to nearly double that of all the other States combined, and almost all of it is used in the manufacture of paper. In 1905 the production of fibrous talc in New York according to the same authority amounted to 56,500 short tons, valued at $445,000. This was a decrease of 7,505 tons in quantity and but a decrease of $62,400 in value, as compared with the previous year. The quantity of talc and soapstone produced by all the other States amounted to only 40,134 short tons valued at $637,062 an increase, however, of 12,950 tons and $203,731 over the output of these other States in 1904.

The importation of talc in 1905, amounted to 4000 short tons, valued at $8,225.

Precious Stones in 1905.

The value of the output of precious stones in the United States in 1905 reached $326,350 as reported to the United States Geological Survey by George F. Kunz.

The largest output is from the sapphire mines, the yield of which amounted to $125,000. Next in value are the turquoise, quoted at $65,000. Then come the tourmalines worth $50,000. Peridots, crystal quartzes, and miscellaneous stones are accredited with a value of $10,000 each. The production of aquamarines is valued at $6,000, of kunzite, gold quartz, chrysoprase, silicified wood, and garnet at $5,000 each, of smoky quartz and chlorastrolite at $3,000 each, of amethyst, agate, pyrite, maladroite, anthracite, and catlinite at $2,000 each, of moss agate at $1,500, of beryl, rosequartz, amazon stone, and arrow



SHIPPING MINES AT COBALT.

points at $1,000 each, of fossil coral at $250, and of dumortierite in quartz at $100.

Efflorescence on Brick Walls.

An article on this subject, prepared by J. C. Jones, of the University of Illinois, is to be published in *Transactions* of the American Ceramic Society. The efflorescence, which is also known as whitewash, kiln white, dry white, wall white, etc., is the white crystalline substance which appears on bricks both before and after they are laid in the wall, seriously disfiguring otherwise attractive buildings. The causes of efflorescence are stated to be:

1. Soluble salts contained in the clay as mined, or developed in the clay by weathering.

2. Soluble substances formed in the clay during burning, partly by chemical changes among the ingredients of the clay itself, and partly by interaction between the materials of the clay and kiln gases.

3. Soluble salts in the mortar used to bind the bricks in the wall, or in the water used in the manufacture of brick or mortar.

4. Soluble substances developed by reactions between the ingredients of the mortar and those of the clay.

5. Soluble salts in the soil or substances lying against the wall.

Efflorescence usually is made up of sulphates and carbonates with, occasionally, salts of other acids which are carried to the surface of the bricks by the evaporation of water which has entered them.

The suggested cures are:

1. The use of clay which has not been weathered.

2. To weather the clay and then wash out all soluble salts.

3. To change soluble into insoluble salts by introducing some precipitating agent, as barium.

4. To remove efflorescence which has been formed in the kiln by alternating oxidizing with reducing conditions during the latter part of the burn.

5. To coat the bricks as they come from the machine with some organic substance.

6. To burn the bricks so that they will absorb the smallest possible amount of water.

7. To coat those portions of the wall below the ground with waterproof paint.

8. To see that the gutters and flues which carry water or steam pipes are so constructed that water cannot reach the walls.

9. To make mortar joints as thin as possible, and to use mortar which is free from sulphur or nearly so.

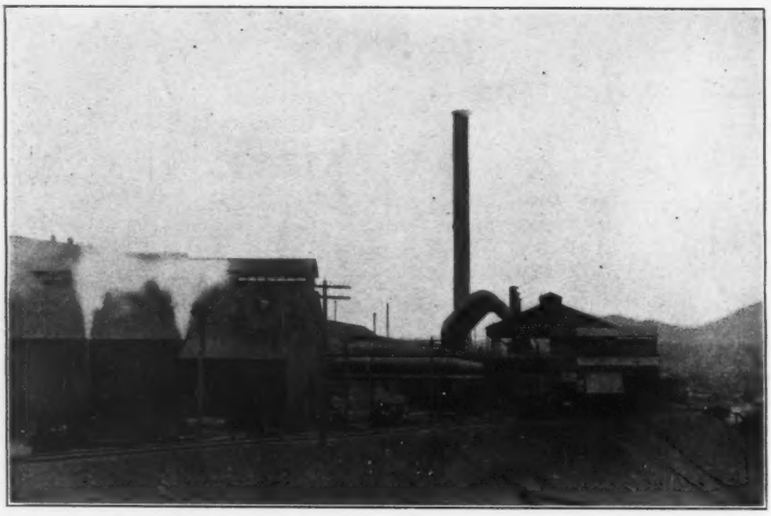
Arizona and Sonora—VI.

BY DWIGHT E. WOODBRIDGE.*

THE OLD DOMINION MINE AND SMELTER.

Old Dominion mine has been completely changed and greatly benefitted by a change in methods in the last few years, or since the present management took hold. Some of the workings were not safe for further operation, being in heavy ground and not commodious enough. Dr. L. D. Ricketts, the present manager, has driven new main levels and openings in rock and has reopened the mine on an important scale. It is now far different from three or four years ago. On account of the fact that the main orebodies, formerly opened, had a solid footwall, but were themselves soft and hard to hold up after mining, main and extraction drifts were changed into the footwall, and old ones were allowed to cave in. A new shaft was also located in the wall and crosscuts were all driven in solid ground. Shafts for development and ventilation were started. The new methods were due, in part, to a radical difference in the view of the property by the new management, the former methods of operation (mining the rich ores by close selection and sorting) being considered incorrect. The property was thence-

NEW CONCENTRATING MILL AND ORE BINS.



SMELTING PLANT AND POWER HOUSE.

forward to be considered as a larger mine, of lower grade, the whole orebody to be taken out, and treated by improved methods of reduction.

This change of policy necessitated a far larger production of ore daily, adequate mills for concentration of the ore, ample storage capacity, and larger and different smelting works, both for the handling of the ores of this mine and for such outside ores as would assist in making the proper fluxing mixture. All these changes have recently been put into successful operation, and the property, but for a few unexpected and unusual accidents, would before this have been making the expected increase in profits.

There are three shafts, the deepest of which is 1000 ft., and the management is now cutting into sulphides that give excellent promise for the future, not only in size, but also because they will furnish the class of ore in which Globe has been sadly deficient in the past. It is generally considered by geologists who have studied the Globe camp that its great future lies, not in its high-grade oxide replacement ores in the limestone, but in its fissure veins in igneous rock at depth, and the recent discoveries of the Old Dominion seem to bear out this assertion.

The principal active ore zone of the mine at present lies along a wide and deeply thrown fault, which has a northeast strike and a sharp dip to the southeast. The foot of this fault is diabase; ore occurs in limestone against it. The mine makes, normally, about 1600 gal. of water per minute, but of late this volume has been considerably increased. The mine is the "sump" of the district, and water is probably coming to it from surface drainage through broken ground, which can, and will, be averted by passing Pinal creek along a large watertight launder. There has been a heavy increase in pumping equipment recently, which consists mainly of Prescotts located on the 10th and 12th levels.

The mine is worked square set, waste gobbed back, though there is some ground which it has been found possible to work by stull timbering. It is an interesting fact that this mine is now working old gob and filling for the fourth or fifth time. It was opened originally when oxide ores were mined downward from the grass roots, when coke had to be hauled by wagon 100 miles over hard roads, and cost $45 per ton at the works. At that time nothing less than 20 to 25 per cent. ore could be successfully treated. Anything lower in copper was waste rock and was filled back in the mined-out rooms. Later, with cheaper fuel, better transportation, better methods, lower labor costs, it has been possible successively to lower the tenor of ore mined; until now, with a 5 or 6 per cent. ore passing as a high-grade material, the mine is so worked that it is very improbable that there can ever be another reworking of the gob.

The Old Dominion orebodies are proving large and persistent. In the western end, which has been developed recently, ores were opened, previous to the recent disastrous fire in the Interloper shaft, that seemed the largest and most promising in the history of the mine. This ore is already proved more than 200 by 200 by 100 ft., and carries a copper tenor more than double the 5 per cent. average of the mine; indeed, at the time of the fire, the smelting mixture had been improved 100 per cent. in copper by ore mined in this portion of the mine. Because of the ruin of Interloper shaft by fire the company is now sinking a new

*Mining engineer, Duluth, Minn.

one, which is to be main pumping avenue for the entire property. It is located in the valley near Pinal creek, and will catch the main drainage from surface. It is now down about 250 ft., and will be sunk as fast as possible and heavily equipped with pumping machinery. At present the mine is making about 3,500,000 gal. per day, all of which will be led to this shaft. Still another shaft is being sunk, located to the east, and while it is not expected to become a large producer it will greatly assist in the operation of the mine as a whole.

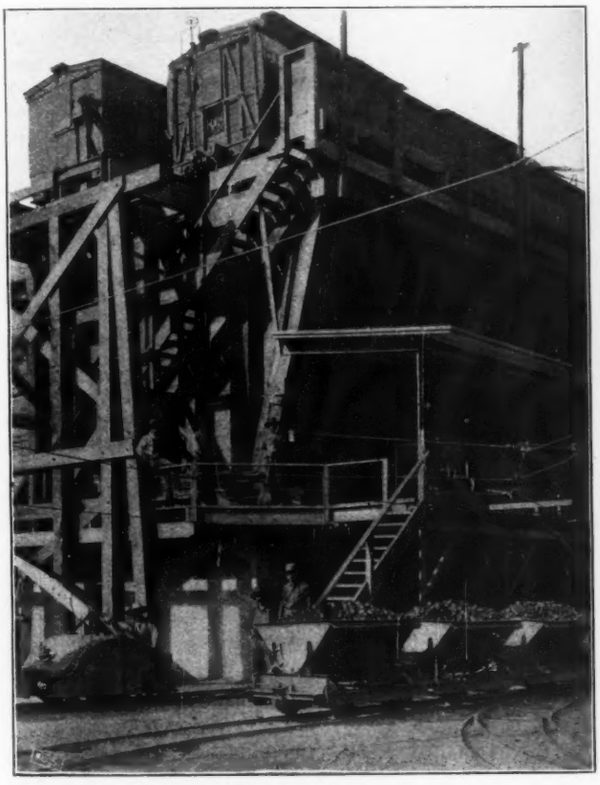
Ore is delivered at surface in mine cars and trammed to a series of storage bins, from which the mine car passes on a circular shaft to the other side of the shaft, to be again returned underground. Six small storage bins, to hold first-class ore, concentrating ore and lean ore for converter lining, are provided at the mouth of the shaft. These bins also receive ore from a tunnel and from custom mines. Each of these bins has capacity for 1460 cu.ft. of ore. From them, ore is drawn on a 30-in. conveyor belt, and passed over a 2-in. trommel, to one of two crushers, which deliver it to a picking belt, where one man picks off, from the concentrating ores, material of high grade, talc, wood, refuse, etc., and these are returned to a surface landing near the shaft. From the picking belt the ore passes through a crusher, up an elevator, through rolls, and thence into a bin house, where a tripper distributes the various ores to their proper bins, either smelting, concentrating or converter lining. There are eight of these bins, the capacity of each of which is 4150 cu.ft., and ore is drawn from them on one side to converter and smelter ore bins, of which there are six, and on the other side, through automatic feeders, upon a belt for the concentrator. The cost of this operation, i.e., delivering ore out of these storage bins from the shaft, is 7c. per ton, the capacity for moving ore is 75 tons per hour, and the average indicated horse power varies from 49.15, with load, to 31.55 without load.

Concentrating ore, to the amount of about 325 tons per day, passes up a 16-in. belt to the top of the concentrator building. The concentration is done on the successive crushing system. There are jigs and tables on the roughing floors, with the re-grinding of rejects in Chilean mills for further treatment, together with the fines of the earlier operations. On the finishing floor more tables and vanners are now being added, and the mill will soon have capacity for 15,000 tons per month, which is concentrated about 3.5:1. The concentrates pass to the smelter storage bins.

The Old Dominion is the chief operator, and the only smelter in the Globe district. Its plant consists of a concentrating mill calculated to reduce 10,000 tons of raw ore monthly, and now being increased to a capacity for 500 tons per day; and a blast furnace and converting works, with capacity for 1600 to 1700 tons of raw ore per day. At the time of my visit to the works, three furnaces were in blast and No. 4 was nearly ready. This is now in commission, and the mine is making upward of 3,600,000 lb. per month.

One thing is especially noticeable about the Globe reduction plant, viz.; its payroll is exceptionally small. Three furnaces were being served by nine men per shift, these nine doing all the work from the ore bins to the tapping floor. With the addition of No. 4 furnace it was estimated that one more man would be required each shift. The nine consisted of a foreman, two weighers at the bin scales, three with the motors engaged in hauling ore to the furnaces and on track, and three on the charging floor occupied in shoveling ore into the furnaces and watching their operation. As a result, while the average wages is more than elsewhere in the southwest, being $2.96, including foreman and Mexican roustabouts, the labor cost per ton of product is lower than anywhere else in the region.

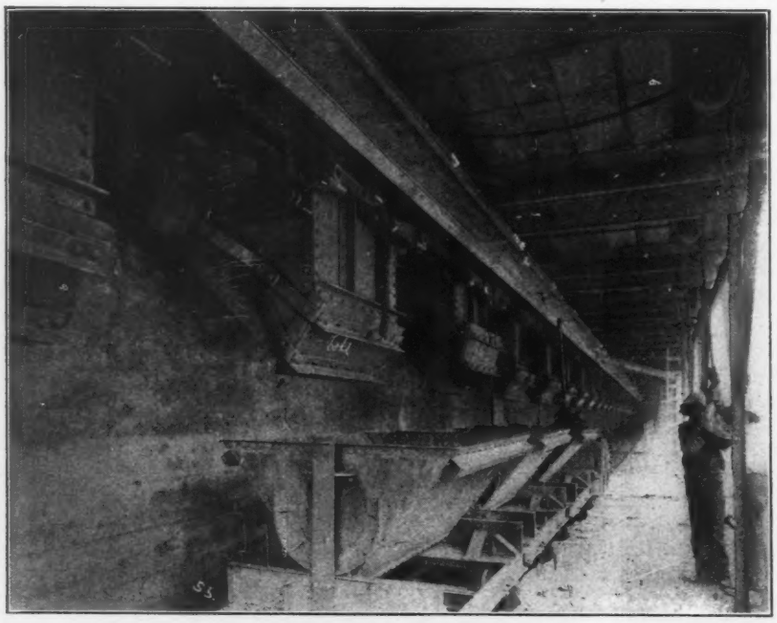
No. 4 furnace is an advance in methods over the three previously in commission. It is 50x196 in., while the others are only 42x180 in. It is provided with jackets, each section of which is 33 in. wide by 14 ft. long, instead of 8x14 ft, as heretofore. The narrow jackets are expected to show less tendency to warp under heat. It will be noticed that the furnaces are quite deep, but the charge is maintained at about 7 ft. The old furnaces have brick shafts, while No. 4 is water-jacketed all the way up.



ORE AND COKE STORAGE BINS AT FURNACES.

SCALE OR MIDDLE FLOOR, ORE STORAGE BINS.

The furnaces are all fed from a large wooden storage bin system, located close to the smelter building. Hopper bottom railway cars from the mines discharge into bins their coarse ore, concentrates, fuel and flux. These bins hold about 2500 tons of ore, and 700 of coke, lime and concentrates. There is a series of 46 large Howe scales on the floor below the bins, one scale for each gate in bin bottom, and all charges are weighed in these and dropped into charging buggies beneath, by two men. The buggies are motor-drawn and stand on tracks on the level of the charging floor. The furnaces are set in a row at right angles to the bins, and the track system for the charging buggies runs on both sides, one man being employed to tend switches, oil the curves, etc. An average of 1700 tons per day is handled through these bins.



LOWER OR HOPPER FLOOR, ORE STORAGE BINS.

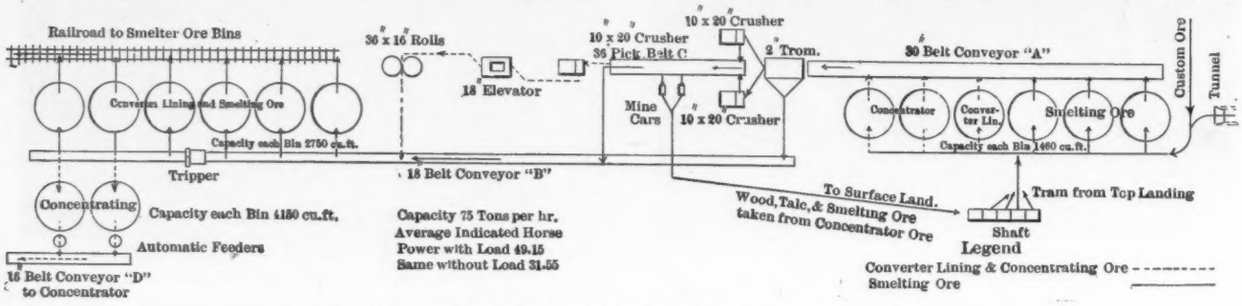
The ores treated include coarse crushed firsts, fed direct, and Old Dominion concentrates from Nacozari and Cananea, Mexico. There is also a constantly increasing volume of custom ores, and of late such ores have formed a very important portion of the total charge, on account of the difficulties of serving the furnaces with Old Dominion ores, while the greater part of the mine is out of commission. In May more than 5000 tons of custom ores reached the smelter from mines of the district which were referred to in my article on the Globe district, published in the JOURNAL of June 30. The United Globe mines have increased their daily shipments and the company's Continental mine, 15 miles distant, is now sending down about 35 tons a day. These receipts from outside mines could be considerably larger if teams could be had to haul the ore wagons over the difficult roads. Fires, suffocating gases therefrom, and subsequent water troubles resulted in curtailing severely the Old Dominion company's production. It has been necessary in order to maintain furnaces in commission, that old dumps, old shafts, and the large slag heaps left from former smelting operations, all be utilized to the fullest extent.

Nacozari concentrates have been running about 15 per cent. copper, Cananea 8 per cent. and Old Dominion about 12 per cent. The former two are high in sulphur, which accounts for their presence so far from home. Local ores are especially deficient in sulphur and high in silica, and the latter is penalized by the smelter, at 10c. per unit of excess. In the custom ores there is a considerable tonnage of chrysocolla, carrying 70 to 71 per cent. silica. On the lower levels of Old Dominion, sulphide ores have been coming in, much to the relief of the company, and it is believed that in course of time outside concentrates can be dispensed with. Local ores carry ample iron, and up to say, 4 per cent. copper. The matte produces assays about 50 per cent. copper, while the slag goes 38 per cent. silica, 8 per cent alumina and 11 per cent. lime.

The converter slag is poured into the settlers, in conformity with practice at most modern works. The settlers are very large, and are lined with magnesia and fire brick, backed by clay and sand. Briquetting of flue dust is effected with lime as a binder, but experiments are under way with a binding material of concentrator slimes carrying 1.5 per cent. copper. Although it may take up to 10 per cent. of these to hold the dust, they carry copper and there is a saving in that. An old dump containing about 400,000 tons of slag, made a number of years ago when furnace practice was to make black copper from high-grade ore, averages about 4 per cent. copper, and is being broken down and delivered at the furnaces at about 40c. per ton. One of the interesting features of the works is the slag track system, which has been worked out excellently, and is a great saving of room and time.

Tin Plate Production in the United States.

The Census Bureau reports that the total output of tin plate and terne plates in the calendar year 1904 amounted to 1,026,384,851 lb., valued at $34,549,543, or about 3.37 c. per lb., as compared with 849,004,022 lb., valued at $31,284,145, or over 3.68 c. per lb., in the year ended May 31, 1900. Of the total production of tin plates and terne plates in 1904, 867,526,985 lb., valued at $28,429,971, or over 3.27 c. per lb., were tin plates, as compared with 707,718,239 lb., valued at $25,553,021, or over 3.61 c. per lb., in 1900. Terne plates also show an increase in production and value in 1904 as compared with 1900, the output amounting in 1904 to 158,857,866 lb., valued at $6,119,572, or over 3.84 c. per lb., as compared with 141,285,783 lb., valued at $5,731,124, or over 4 c. per lb., in 1900.

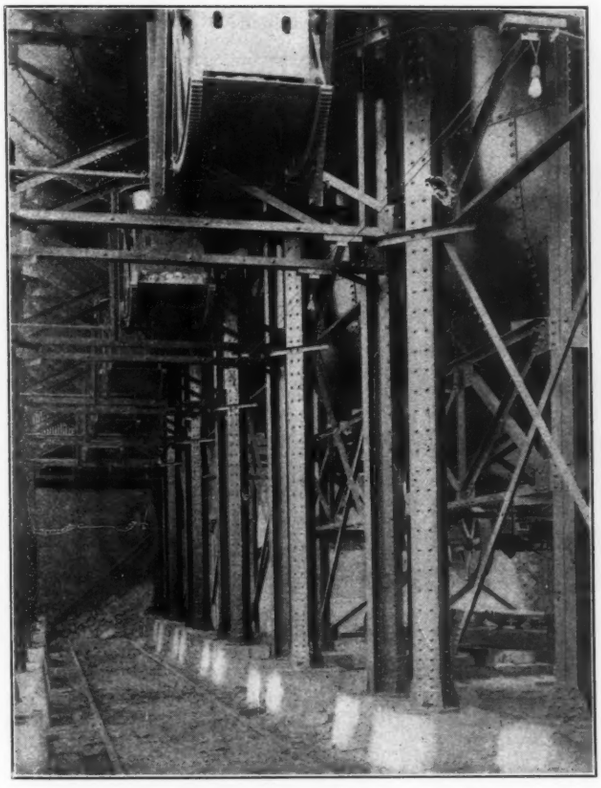


FLOW SHEET OF CRUSHER PLANT, BETWEEN MINE AND CONCENTRATOR.

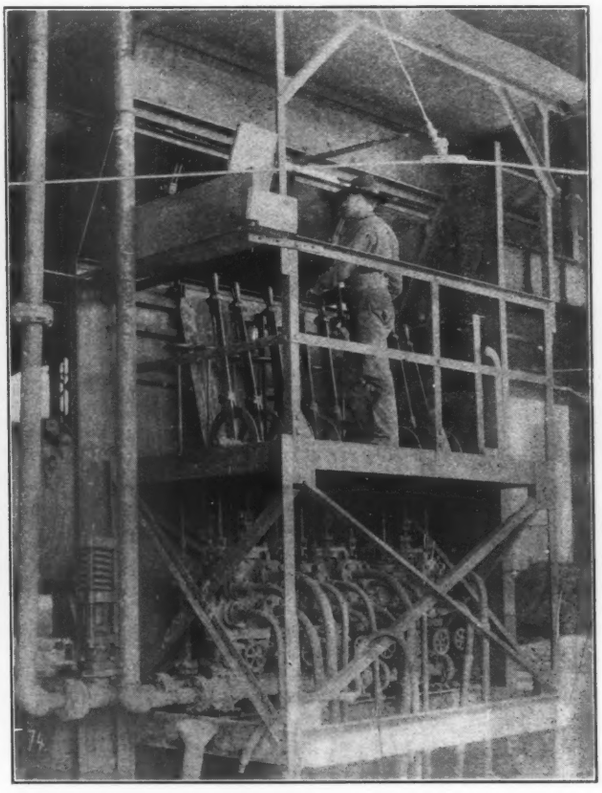
Cobalt and the Timiskaming Country.

SPECIAL CORRESPONDENCE.

The Ontario Bureau of Mines has been officially notified of the discovery of a small but rich silver vein in Lorraine township east of the Cobalt area. A silver-cobalt find has also been made at Point Fine on Lake Timiskaming, lying south of Lorraine. Prospectors have been a good deal attracted lately toward the region around Lake Timiskaming, good finds being reported both on the Ontario and Quebec sides of the lake, including silver, smaltite, galena and cobalt. Definite particulars, however, are lacking.



BOTTOM OF STEEL TANK ORE BINS ABOVE CONCENTRATOR.



PULPIT FOR HANDLING CONVERTERS IN SMELTER BUILDING.

At the McKinley and Darragh mine, at Cobalt, a good deposite of argentite has been found. The Glen Lake Mining Company, of which R. A. Bailey is manager, has made a good silver discovery. The Nipissing Mining Company's hydraulic plant, the installation of which is about completed, consists of two 125-h.p. boilers, a 150-h.p. engine, and an 8-in. two-stage turbine pump with a capacity of 1800 gal. per minute.

Active work is being carried on at many locations up the Montreal river. Numerous cobalt-veins have been found carrying some silver content, but so far nothing approaching in richness the finds on or near the surface characteristic of the Cobalt area, and it is considered probable that much more development work will require to be done than was necessary to enable the Cobalt mine owners to show satisfactory returns. A copper-gold prospect on the Matawabika river, some 12 miles up the Montreal from Latchford, is being developed by W. Klock, who has a force of eight men at work. The country to the northwest, as far up as can be reached by the Montreal and its tributaries, is being prospected and many finds are reported.

A rich find of calcite carrying galena, silver and copper has been made on Lot 5, Concession 5, Ingram township, about 28 miles to the north of the Cobalt camp and near Wendigo lake. The vein is 5 in. wide and has been followed for 600 ft., smaller veins branching from it. The discovery causes much excitement. Another discovery has been made in Bucke township, the ore assaying very high in silver.

A new vein rich in silver and quite wide has been struck on the Foster property in the Cobalt area.

Mining in Eastern Ontario.

E. T. Corkill, provincial inspector of mines, after an official tour through the mining districts of Eastern Ontario, reports the industry to be generally in a good condition. The most important development is the increase in the production of iron pyrites for use in the manufacture of sulphuric acid. The American Madoc Mining Company is making large shipments from its mines near Madoc in Hastings county, Buffalo, and other points. The British American Mining Company has also a producing mine.

The mica industry is more prosperous than has been the case for some time. The manufacturing works are nearly all located in Ottawa, where the trimming and splitting of the raw material is done, and about 1000 hands are now employed there, as compared with 500 a year ago. The Lacey mine in Loughboro township, Frontenac county, owned by the General Electric Company, has greatly increased its output this season, and is employing steadily about 45 men. Another important source of supply is the Perth district, where several mica properties are being worked, including the Martha mine and some deposits, owned by Edward Smith, of Prescott.

The Canada Corundum Company's mine, at Craigmont, Renfrew county, under the management of H. E. T. Haultain, is employing about 200 men, its output amounting to 300 tons per month. The lead smelter recently erected at Bannockburn, in Hastings county, is treating the lead ore produced at the Hollandia and Katharine mines, the latter of which has been re-opened. The Mineral Range Iron Company has received extensive orders from the United States for magnetite ore, and a spur line, four miles in length, is being constructed from the Central Ontario railway to their mine near Bancroft, in Hastings county.

The Daly-West Mine, Park City, Utah.

STAFF CORRESPONDENCE.

The Daly-West mine is in the mountains two miles south of Park City, Utah, its surface plant being 1200 ft. above the town. Owing to the steepness of the road, all heavy traffic to and from the mine is carried through the Ontario tunnel, connecting with the mine's 1200-ft. level. The mine was discovered 15 years ago. The Daly mine had developed the ground to the northeast, and the old Anchor—now the Daly Judge mine—had developed to the southwest, so a new company was formed and a 3-compartment shaft was sunk in the intermediate space. This discovered both the contact deposit between quartzite and limestone and the Daly fissure vein.

PARK CITY, UTAH.

DALY-WEST MINE.

The output of the Daly-West comes from four distinct orebodies—the Daly fissure; the Back vein; the contact deposits; and the 01-02-04 fissure which extends from the contact deposit and carries ore down into the quartzite.

There are two main classes of ore in the mine. The Daly fissure carries a true sulphide deposit of galena with some zinc. In the orebodies above the 900 ft level—the contact deposits and the 01-02-04 fissures—the ores are carbonates carrying some unaltered galena and tetrahedrite. A good part of the ores in the levels above the 900, both in the Daly-West and in the adjoining Quincy, is first-class ore and is not concentrated, while in the Daly fissure, very little first-class ore is found and the bulk of it is milled.

The Daly fissure is one of the main fractures of the Park City district and is an extension of the main Ontario fissure system. It is parallel with the Ontario fissure and lies about 500 ft. south of the Ontario, overlapping it to some extent. Its strike is a few degrees north of east and it cuts sharply across the strata. Along it there has been a vertical displacement of at least 700 ft., so that, owing to the dropping of the hanging block, the hanging wall of the fissure in the Daly-West mine is limestone and the footwall is quartzite. The dip of the Daly fissure in Daly-West ground is about 65 deg. to the north in the upper workings but in depth it flattens to 57 deg. The fault fracture is a strong one and along it there has been a rich mineralization. This extends over a width of 10 to 30 ft. and occurs in a series of shoots along the vein in the brecciated quartzite vein-filling. These shoots are vertical or have a slight pitch toward the west. The ore occurs in seams a foot or so wide, but more frequently they are several feet wide; at some places there is one band of ore, at others, two. Sometimes the ore follows the hanging wall, at others the foot and sometimes there is a band of ore along both the hanging and the foot wall. On the 1500-ft. level of the Daly fissure there is a shoot of ore 900 to 1000 ft. long. A barren bar of ground, about 200 ft. long, separates this shoot from another one which is at least 200 ft. long and the drift is still in ore. No prospecting has been done upon the Daly fissure above the 1200-ft. level.

The contact orebodies and also the 01-02-04 fissure are all in the footwall of the Daly fissure. The contact deposit has a N.E.-S.W. trend and dips about 20 deg. to the N.W. It is said to average 8 ft. thick. The orebodies occur at the intersection of N.E. and S.W. fissures with the quartzite—lime contact. They extend over into the Quincy ground (which since 1902 has belonged to the Daly-West. An orebody along the contact is formed at its intersection by the 01-02-04 fissure. The 01-02-04 is also a N.E.-S.W. fissure and dips about 70 deg. to the northwest, while the "roll fissure" dips about 70 deg. to the southeast. This "roll fissure" lies to the N.E. of the 01-02-04 fissure.

The 01-02-04 fissure is strongly mineralized and produces a lot of good ore. This varies from 10 to 20 ft. thick and is fairly continuous along the strike of the vein. The 01-02 part of the fissure is the vertical part, while the 04 part is the flat bed part which appears to follow a bedding in the quartzite about 60 ft. below the contact.

The Back vein averages about 4 ft. wide and dips about 70 deg. to the south. It also has a northeast trend. Two shoots of ore have been opened up along this Back vein. No development has been done upon the "roll fissure" to see whether it also is mineralized where it cuts through the quartzites. Considerable prospecting is being done on the 900-ft. level upon several N.E.-S.W. fissures.

The orebodies above the 900-ft. level are developed by a series of blind drifts and raises from the 900-ft. level. All the ore comes through these raises down to the 900-ft. level where it is drawn into cars which are made up into trains and hauled by mules to the shaft station. Here the mill dirt is hoisted while the first-class ore is dumped down a raise to the 1200-ft. level where it is trammed in trains to the bins at the mouth of the upper Ontario tunnel.

The 01-02 fissure is being worked by square-sets while the flat 04 extension of it is being worked by a series of cribbed bulk-heads made of 10x10-in. timbers about 6 ft. long, in addition to which, stulls are also used to support the roof. It was necessary to cross-cut about 1000 ft. to

the south from the Daly-West shaft to catch the 01-02 fissure on the 900-ft. level.

The mine is drained by two tunnels; the upper one, which cuts the Daly-West shaft at the 1200-ft. level, is about 2½ miles long. The other, the Ontario drain tunnel, will be about 4 miles long when it reaches the Daly-West shaft, at a depth of 2100 ft. The lower workings of the Daly-West are drained entirely by this tunnel for the water seeps through the rock to it, but to make the lower portion of the fissure available it is necessary to extend the tunnel into Daly-West ground. This was being done when the cave occurred last March.

All the Daly-West orebodies are worked through one shaft. This now is 1630 ft. deep but it will be sunk deeper as soon as the Ontario drain tunnel is in good shape again. It is sunk in the footwall, and is a vertical three-compartment shaft. It is timbered with shaft sets of 10x10-in. Oregon pine, placed 5-ft. centers vertically, and lagged with 3-inch vertical planks. The two hoisting compartments are 4½x5 ft. in the clear and the ladder compartment is 2x5 ft. in the clear. In the ladder compartment are placed the air-pipe and the pump pipe. No pumping is necessary but when the mill gets short of water, in the summer, a small pump, on the 500-ft. level, run by compressed air, affords 40 gal. a minute.

Levels have been opened from this shaft at 700, 900, 1200 and 1400 ft. There are also the 400-ft. Quincy and the 600-ft and 1550-ft. Daly-West, which are blind levels. The ore is hoisted from the latter up a 30-deg. incline to the 1400-ft. level by a small double-drum hoister. The incline is equipped with a three-rail track with a switch half way up so that the cars can pass.

DALY-WEST SURFACE PLANT, CONCENTRATING AND TAILING MILLS.

MINING.

Overhand stoping is used entirely but as the walls of the orebody vary greatly in strength in different stopes, the method of extracting the ore shows great variation. In some of the stopes no timbering was required. Chutes were carried up and the ore was allowed to accumulate in the stope, and only the excess drawn off, the machines being set on top of the broken ore. In other places it was necessary to timber the walls but the broken ore was yet allowed to accumulate in the stope. But in many of the stopes the walls are so weak that, although the stope is timbered with square sets, the ore can not be left there because it would be impossible to draw it out afterward. In such cases the ore is shoveled into the chutes or else run to them in wheelbarrows. The waste is sorted out and dumped into the unfilled square sets. The vein generally does not make enough waste to fill the stopes, so that waste from development work is sent down to fill them. In the worst stopes, 20 or 30 ft. wide, the filling is kept within two sets of the back of the stope. In some cases tracks and turn sheets are put down in the stopes to render this filling easier. In the narrower stopes no filling will be used but the hanging will be allowed to come in and catch itself as soon as all the ore is drawn from the stope.

Within the last year the method of timbering has been changed. Formerly a stringer set was used, but now regulation square sets are employed. The Ontario mine, one of the first large mines in the camp, had strong quartzite walls so that timbering was not difficult, and the stringer-set method answered the purpose. The later mines adopted a similar method, but in the Daly-West, the limestone hanging not being strong and being inclined to swell on exposure to the air, this method was not satisfactory and so square sets were adopted.

The stringer set consisted of a stull of 10x10-in. timber extending horizontally from wall to wall. Vertical posts, 10x10 in.x 7 ft., and 4 ft. apart, resting on top of the set below, supported this stull. They were spiked to the stull with 60-d. nails without any mortising. A 6-in. round spreader was then placed horizontally to bear against both post and stringer and brace them against the next stringer on the same floor. If a stringer had to be more than 16 ft. long two sticks were used, making a butt joint on the top of a post. The length of a stringer was limited to about 16 ft. because of the difficulty of handling a longer one. These stringer sets were not good because they swung easily, were awkward to handle, were fully as expensive as square sets, made it necessary to keep a large amount of ground open, and required specially constructed chutes.

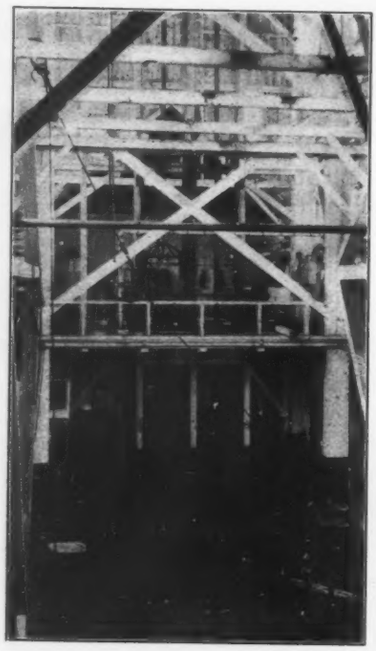
Ingersoll-Sergeant air drills are used; 2¼in. drills with 1¼in. steel for stoping, and 3¼-in. drills with 1½-in., or 1⅞-in. steel for prospecting and drifting.

Mules are used on the 1400-ft. and the 900-ft. levels. A train of nine cars is pulled at one trip.

All powder is handled by a powder boy. Since the blowing up of the magazine on the 1200-ft. level in 1902, powder has been stored at surface and only enough for one day is kept in the mine. The boy delivers the explosive to powder men on the several levels, who measure the holes and give the men the required amounts of powder, together with fuses already capped. The powder man keeps track of the holes and the amount of powder, and in this way not only is kept

an accurate account of the powder, but a saving of about one half is made. Forty and thirty-five per cent. dynamite is used.

The drills used by each shift are kept separate. Each suit has a locker for his sharp drills on each level. He gives the miners the drills they need and at the end of the shift they lower both dull and sharp drills to the level below; a mucker takes them to the locker where the shift



DALY-WEST, HEAD FRAME.

boss checks them up. The sharp ones are locked up while the dull ones are sent on top.

Little Jap air-hammers have been tried but they were not satisfactory. Rust scaling off from the inside of the air pipes and particles of dirt get into their valves and put them out of commission. They have been taken out of the mine. The Murphy air-hammer drill has been tried and has given such satisfaction that the management is thinking of using them in the stopes instead of mounted drills. These Murphy air-hammers drill 3-ft. holes without any difficulty, and have drilled four 3-ft. holes in half a shift in some of the Daly-West stopes.

The surface equipment of the mine consists of a timber shed in which are various mounted saws, a repair shop in which all the cars are made and air-drills repaired, and a blacksmith shop. Five Babcock & Wilcox boilers, aggregating 1050 h.p., furnish mine and mill with steam; the boilers are equipped with American stokers. A 15-drill, 2-stage Ingersoll-Sergeant, and a reserve 6- to 8-drill Leyner compressor furnish air at 85 lb. per sq. in. A 500-h.p. Bullock double reel direct-driven hoisting engine, capable of sinking to 2500 ft., does the hoisting. A 8x½ in. flat cable and 3-deck cages are used. The cars hold about 1 ton of first-class ore and a little over a ton of concentrates. Chairs are used in the shaft.

The head-frame is of the letter A type. The posts are 16x16-in. timbers and the back braces are 20x15-in. It is about 80 ft. from the collar of the shaft to the sheave wheel.

The Daly-West mine employs about 240 men on both shifts, and the mine produces about 350 tons of ore a day of which about 45 tons is first-class ore.

The first-class ore averages 52 oz. Ag, 0.04 oz. Au, 18.4 per cent Pb, 1.9 per cent. Cu, 9.4 per cent. Zn, and sells for about $32.50 per ton.

A large number of the men board at the mine. They are kept in barn like bunk-houses, some 20 or 30 men sleeping in one room. It would seem that a company which has paid $5,067,000 in dividends could do better than this by its employees.

Nova Scotia Minerals.

The report of the Department of Mines of Nova Scotia gives the following statement of the mineral production of that Province for the fiscal year ended Sept. 30:

	1904.	1905.	Changes.
Gold, oz.....	14,279	15,550	I. 1,271
Iron ore, tons.....	258,338	73,600	D. 184,738
Manganese ore, tons	.....	22	I. 22
Coal mined, tons....	5,247,135	5,050,420	D. 196,715
Coke made, tons.....	235,158	367,778	I. 132,620
Gypsum, tons.....	181,166	197,292	I. 16,126
Limestone, tons.....	191,356	274,002	I. 82 646
Barytes, tons.....	1,100	4,500	I. 3,400
Molding sand, tons..	175	230	I. 55

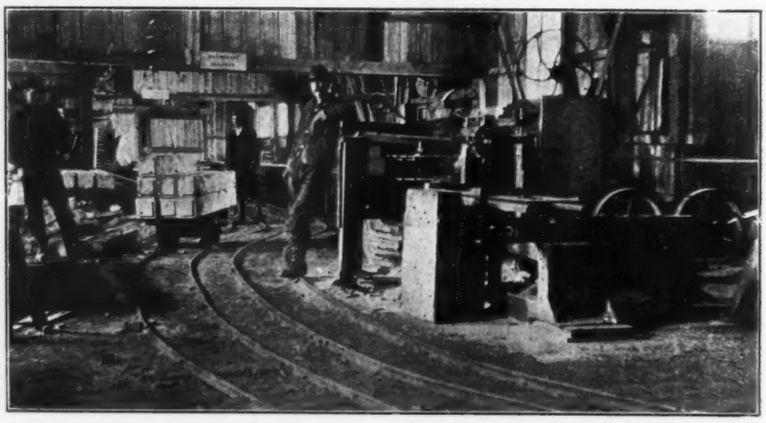
The year 1905 showed considerable gains in almost every item, except iron ore and coal.

In addition to the output given above, there were 4000 tons of gold-bearing antimony ore mined by the Dominion Antimony Company. The total gold ore mined and crushed during the year was 71,725 tons. The falling off in iron ore was made up by the importation of 274,-274,002 tons, chiefly from Newfoundland.

Conditions in the Transvaal.

At the annual meeting of A. Goerz & Co., at Johannesburg, May 25, Mr. Brakhan, the chairman, said that the value of South African shares had been adversely affected through various influences, resulting in enormous liquidation. The company had spent about £450,000 on the purchase of shares in companies in which the group was interested, thus giving proof of its faith in the prospects of the industry. During the year there had been a large expansion of work on developing mines owing to further arrivals of Chinese laborers, resulting in the employment of additional white workmen. It is doubtful, however, whether the number of the latter can increase further so long as the present uncertainty regarding the supply of unskilled labor existed. A good many excellent white workmen are employed on the Rand, but there are also a number of unwilling and inefficient ones. A reduction in working costs largely depends on the support given to the managements by the skilled workmen. Owing to the comparatively small native population, and their ability to raise the necessaries of life themselves, and also to the outside demand on their labor, the mines are prevented from obtaining a sufficiency from this source, and the employment of Chinese was consequently necessary. The latter have materially improved in efficiency.

The following soldering flux, noted in the *Brass World*, Jan., 1906, is now used at some of the Government arsenals: Chloride of zinc solution, 1 part; glycerin, 1 part; alcohol, 1 part. The solution of chloride of zinc is made by dissolving zinc in strong muriatic acid until the acid will dissolve no more. The glycerin is the ordinary commercial material. The alcohol may be either wood or grain-alcohol. The flux is used either with a blow-pipe or with the usual soldering iron. Ordinary soft-solder is used in connection with it.



DALY-WEST, TIMBER SHOP.

Electric Mining Locomotives in Great Britain.

BY J. F. GAIRNS

The employment of electric locomotives for mining work, is essentially an American and Continental practice, and most work in connection with the design and development of such machines must be credited to the engineers of those countries.

This is principally due to the difference of conditions, for there are not many collieries in Great Britain where electric locomotive traction is either convenient or suitable, and for this reason a considerable proportion of the work of this kind that is done, is in connection with locomotives supplied for use abroad; yet the work of several British firms is of sufficient interest to be worthy of description, and a few representative engines are here used as examples.

As American and Continental engineers are mainly responsible for the principal features of design as generally comprised in locomotives for mining service, it is almost inevitable that in many ways British practice corresponds closely with that of the countries mentioned, but the electrical details, except in the case of British firms of American derivation, are of English design and origin, to a considerable degree.

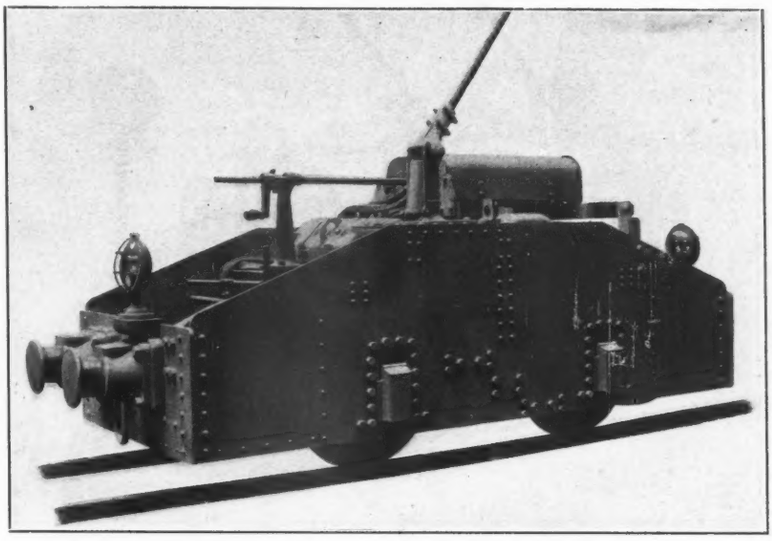


FIG. 1.

A few locomotives of the usual type employed for use in the mines, and where a very limited headway has to be provided for, will receive first attention.

Fig. 1. illustrates a locomotive built by Mather & Platt, Ltd., the well known Manchester firm of electrical engineers, for use at a Spanish copper mine. The gage of track is 2 ft. 5½ in., and the overall dimensions had to be such that the engine would pass through roads 5 ft. 6 in. high, and 5 ft 3 in. wide and be able to traverse with ease curves of 50 ft. radius. The locomotive is designed for a speed of 10 miles per hour and is capable of hauling a maximum load of 12 cars, each weighing two tons when loaded upon grades of one per cent. The two motors are of the usual inclosed railway type, together providing for a tractive effort of 1100 lb. at 10 motor horse-power with direct current at 500 volts, supplied by means of an overhead conductor and collected through an ordinary trolley pole. The usual electrical appliances are fitted, and electric brakes are provided for, in addition to the hand brakes.

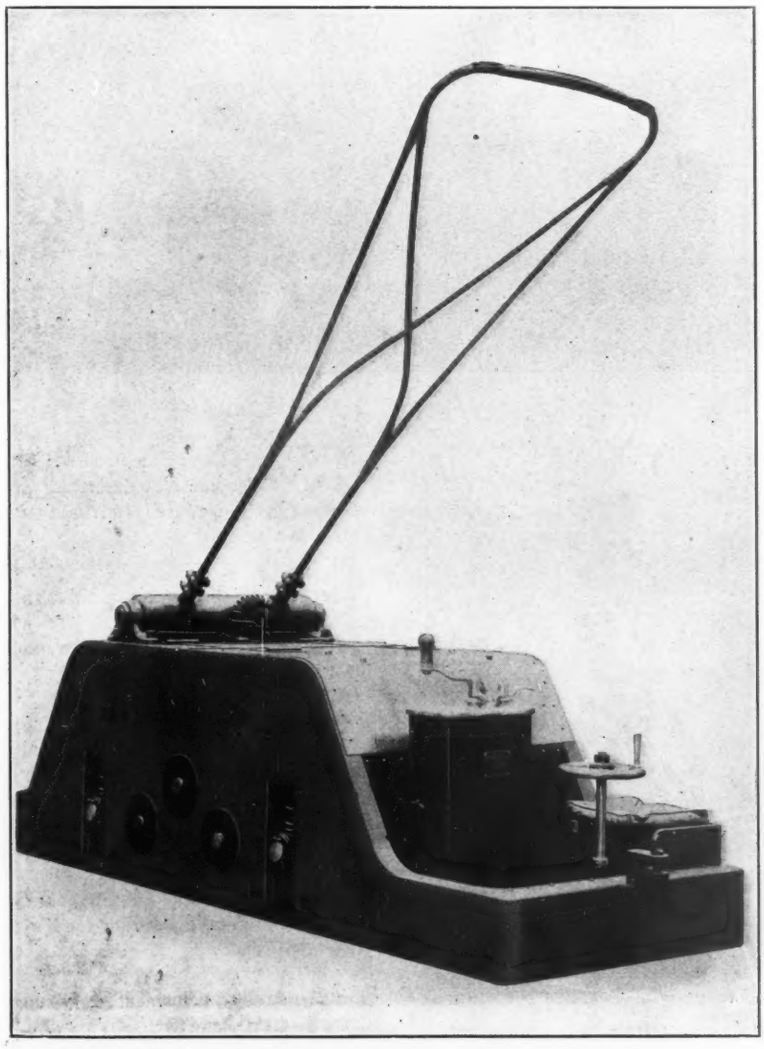


FIG. 2.

Fig. 2 Illustrates another class of small locomotive suitable for mining work, the builders in this case being Dick, Kerr & Co., Ltd. The gage of track is only 18 in. and the locomotive, which has a wheelbase of 44 in. is propelled by a single motor geared to the driving axle, through double reduction gearing a gear ratio of 10 to 1. The series-wound motor is rated at 15 h.p. with current at 220 volts. The sliding-bow collecter has an easily renewable sliding surface of white metal. The locomotive weighs about 2¼ tons.

In Fig. 3 we see another class of mining locomotive, the builders being in this case the Electric Construction Company, of Wolverhampton. This engine is designed for very limited headway, is 3 ft. wide and 3 ft. 4 in. high. It has to pass through entries no higher than 6 ft., and weighs about 4½ tons. It is capable of

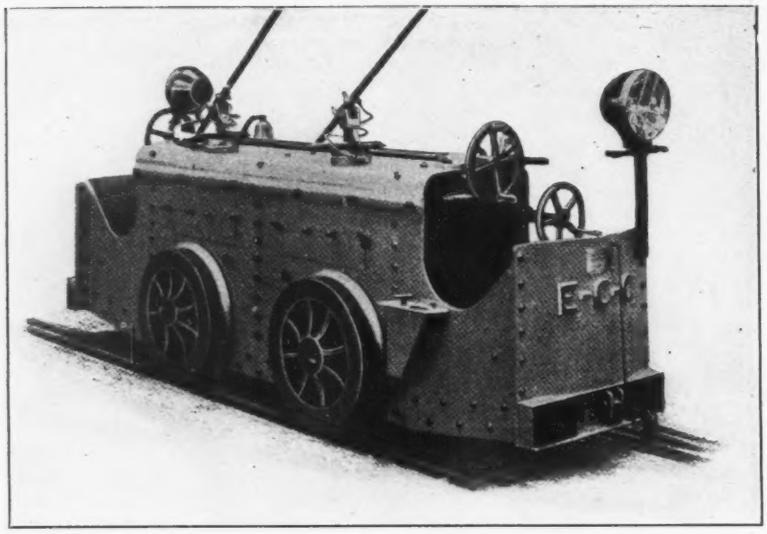


FIG. 3.

hauling 35 tons at from 5 to 6 miles per hour. Two motors are fitted, each developing 12½ h.p.

The engine can be controlled from either end. Double over head conductors and trolley poles are employed, as the rails are not used for return.

Fig. 4 shows another type of electric mining locomotive built by Ernest, Scott & Mountain, Ldt., of Newcastle-on-Tyne. It is of the low type, built compactly, and able to withstand much rough usage.

The locomotive shown in Fig. 5 is one also built by Mather & Platt for service in Sweden. It is designed to haul a load of 70 tons at a speed of 4½ miles per hour. Current at 300 volts is supplied by means of an overhead conductor, and united by means of the collecters shown. The motor is of the double-armature Hopkinson type, and is geared to the axles through 10 to 1 spur gearing.

Fig. 6 illustrates a Westinghouse locomotive employed at the Duddington shale mines and oil works in Scotland, for hauling material between the mines and the works, a distahce of two miles. It can deal with loads of 40 tons at a speed of 10 miles per hour. Current at 400 volts is supplied by means of the overhead conductor. As will be seen, the upper portion of the locomotive forms a platform which is available for the carriage of light goods.

The electric locomotives described represent a selection of the usual types employed in British practice for small scale industrial work. In the case of larger machines, the designs are more or less similar to those used for electric freight service on the railways equipped for electric traction. I am indebted to the builders of the locomotives described for the photographs reproduced and for the foregoing particulars.

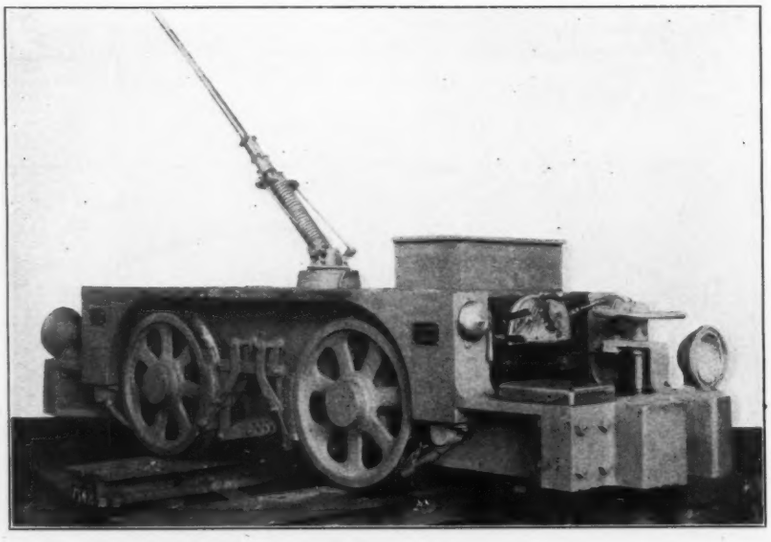


FIG. 4.

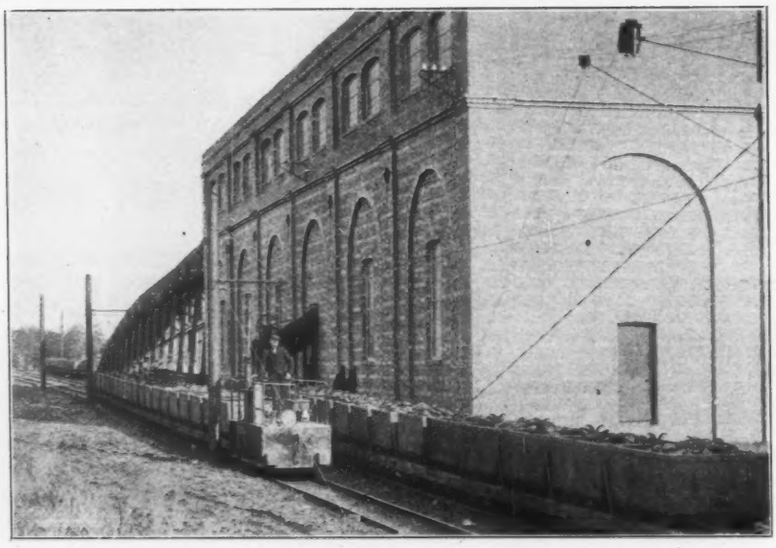


FIG. 6.

Underground Fans as a Method of Ventilation.

BY F. W. PARSONS.

The general method for ventilating coal mines has been to install a suction or blower fan on the surface, connecting it to the upcast or downcast shaft leading to the workings. Recent installations are showing that fans erected underground prove more effective than on top. It is frequently the practice in this country to use electric fans in remote and poorly ventilated workings, to remedy deficiencies in the general system as operated from the surface. Such underground fans act as boosters, and well answer the purpose for which they are intended. The

Colorado Fuel and Iron Company recently installed a fan of this style in the remote workings of its Starkville mine, which resulted in a material improvement in the character of the ventilation in that part of the mine, the only difficulty being that the fan could not be run at a high speed without drawing dust.

However, the establishment of large fans at the shaft bottom, to replace the surface installation, is a comparatively new departure, and the extent to which such a system will be used is a matter to be determined by the future.

The ventilating current, when promoted by underground fans, can be more evenly distributed throughout the workings, and will answer more readily to requirements placed upon it. Another advantage is the possible use of several small fans, which prevents the disarrangement of the entire current, should any one unit cease to work. Especially is such a system beneficial when several seams of coal at different depths, are worked from the same shaft. In this case, one fan is placed on each level to ventilate the workings in that particular seam, and the system is so arranged that the air is made to course from the downcast shaft through the workings, and through the fan, into the upcast shaft.

The use of underground fans is best suited to mines where there is not much gas, and where electric power is carried through the mine for haulage, machine-work, etc. In this case the system is most adaptable, and has the additional advantage of great flexibility, since small fans can be put in isolated parts, where ventilation depending on a large surface fan would necessarily be difficult and inadequate. The ease of installation, high efficiency and small space occupied by an electric motor, make this power particularly suitable for this system of ventilation.

Further refinements and precautions can be adopted in establishing a system of underground fans. Branch roads can be driven so that, in the event of an explosion, the doors leading to these air-roads would open because of the increased pressure, and allow the explosive force to pass out. It is also advisable in some cases to erect a surface fan to be used in case of accidents or repairs underground. When such a fan is installed, it is necessary to provide trap doors at the top of the shaft, to shut off any open communication between the outside atmosphere and the mine, should the surface fan be required.

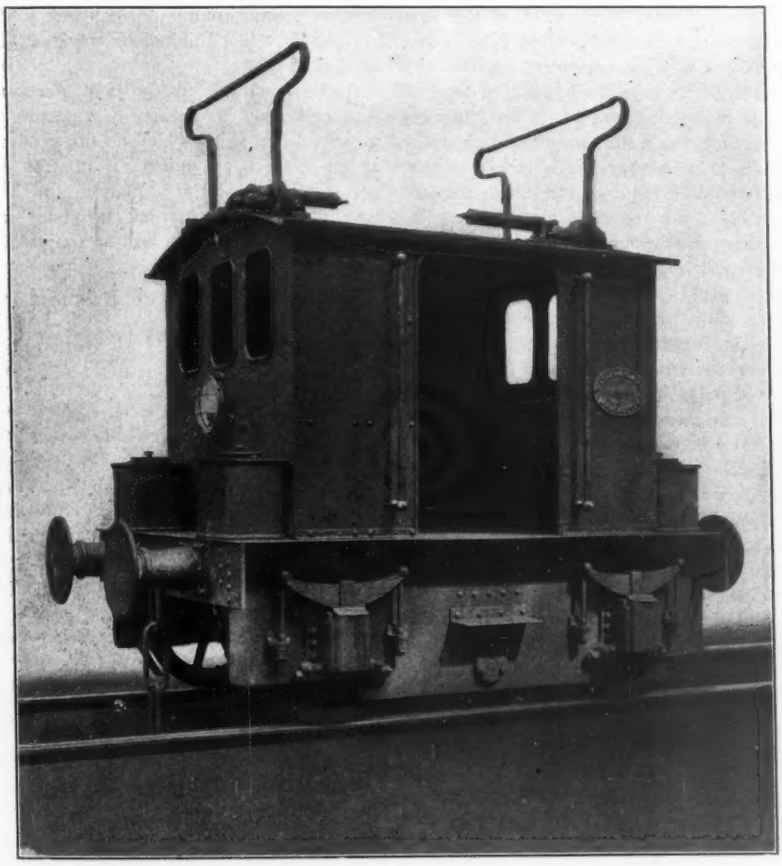


FIG. 5.

The Australian Smelting Corporation, which has been considering the matter of moving its plant to a new location, has finally decided to remain at Dapto.

The Coal Resources of the United Kingdom.*

BY J. L. PULTZ.†

In determining the available resources of the proved coal fields, 4000 ft. was set as the limit of practical depth in working, and 1 ft. minimum workable thickness. There are no actual coal workings at depths exceeding 4000 ft. and the conditions to be met with at such depths are largely a matter of conjecture. Within recent years the depths at which coal is being worked has rapidly increased, and there are now several collieries, especially in Belgium, where seams are being worked in excess of 3000 ft. No engineering or mechanical difficulties are likely to arise in connection with deep workings, and excessive pressure is not likely to prove an insurmountable obstacle. An increase of pressure has some advantages as well as disadvantages; it may increase the percentage of small coal, and the cost of maintaining the roadways, and of timbering, but it assists the working of the coal. The chief obstacles to deep working are high temperatures and cost. The Continental experts place the limit of workings at 4900 feet. Up to the present time, no special appliances have been tried or required in order to cool the workings in the deep mines, the necessary reduction in temperature having been obtained by having strong currents of air.

The thicker and more valuable seams are the first to be worked. There are, however, several districts where thin seams have been, and are worked to considerable extent with good results. In 1900, 17.7 per cent. of the total output of the United Kingdom was from seams of less than 3 ft. in thickness. Thin seams generally are of less commercial value than thick seams, the production per man being usually less, and the cost of working as a rule more; but whether a particular seam is workable or not, depends not so much upon its thickness as upon its quality, the nature of the roof and floor, its geographical position, the cost of working and the selling price. Thin seams are also workable when they are found in conjunction with another seam, whether of coal, iron ore, fire clay, or other mineral, and where there is little or no competition with thicker seams. Where a shaft is already in existence, and the thick seams have been worked out, it is often of advantage to continue working the thin seams rather than to abandon the colliery.

The estimated quantity of coal in the coal fields of the United Kingdom, after making the necessary deductions, is 100,914,668,167 tons, which is distributed among seven districts. The first district

*Notes from the final report of the Royal Commission on Coal Supplies, 1905.

†Consulting mining engineer, New York City.

comprises South Wales, Monmouthshire, Somersetshire, Forst of Dean and part of Gloucestershire, having a total of 30,927,831,125 tons; the second district comprising North and South Stafford, Warwick, Leicester and Shropshire has an estimated quantity of 9,056,932,572 tons; in Lancashire, Cheshire and North Wales, which form the third district, there are 6,266,807,827 tons; district 4, comprising Yorks, Derby and Motts, contains 26,498,731,495 tons; the fifth district comprises Northumberland, Cumberland and Durham with 12,308,450,792 tons; Scotland forms the sixth district, having 15,681,456,356 tons to her credit; the last field here enumerated is the district comprising Ireland and having a total of 174,458,000 tons, making in the combined seven districts, the total tonnage before mentioned. Of these available resources, 79.3 per cent. is contained in seams 2 ft. thick and upward. This, however, does not include Ireland, Somerset and Gloucester, as the details for these districts did not permit of such calculation. Of the available resources, 91.6 per cent. is contained in seams of 18 in. and upward.

In addition to the coal within 4000 ft. of the surface, there are in the proved coal fields considerable quantities lying at greater depths; whether that coal, or any of it, can be recovered, depends upon the maximum depth at which it is possible to carry on mining operations. The estimated quantities of such coal has been placed at 5,239,433,980 tons.

The amount of coal which may be expected to be available in the concealed and unproved coal fields at depths less than 4000 ft., is 39,483,844,000 tons, which does not include certain areas where the data are insufficient for an estimate. Under this head come also the available resources of that part of the Cumberland coal field which lies beyond 5 miles and within 12 miles of high-water mark, estimated at 854,608,307 tons, and the available resources of anthracite in the South Wales coal field under the sea at St. Bridges Bay, and part of Carmarthan Bay, approximately 383,024,000 tons.

The probable duration of the coal resources of the United Kingdom depends chiefly on the maintenance or the variation of the annual output. The present annual output is in round numbers 230,000,000 tons and the calculated available resources in the proved coal fields are in round numbers 100,000,000,000 tons exclusive of the 40,000,000,000 tons in the unproved coal fields, which is regarded by the Report as speculative.

For the last 30 years the average increase in output has been 2½ per cent. per annum. It is the general opinion of the district commissioners that, owing to physical considerations, it is highly improbable that the present rate of increase of the output of coal can long continue. They think that some districts have already attained their maximum output, but on the other hand, the development in the newer coal fields will possibly increase the annual output for some years to come.

In estimating the future coal output of the United Kingdom, the decrement in rate of increase in population must be considered. The period of maximum increase in the rate of output of coal was reached in 1871. With the 30 years or more experience showing this large average decrement in the rate of increase of home consumption of over 25 per cent. per decade, just four times that of the rate of increase of population, it is evident that the population and coal consumption per head basis of calculation, would very largely exceed those arrived at by the adoption of the past average decremental rate of increase of the coal output itself. The calculated future coal output during a period extending over the next three centuries from 1901, arrived at on the population and home consumption per head basis, would amount to 225,714,000,000 tons, a very much larger output than would be required if the calculations were based on the decremental rates of the respective outputs of home consumption and export coal, which during the much longer period of four centuries, would only amount to 208,081,000,000 tons.

The calculations based upon the actual average decrement in rates of increase of the coal itself, during a period of 30 years, which has witnessed the greatest development of commercial and industrial enterprises the United Kingdom has ever experienced, is the best indication of what is likely to happen in the future. The results obtained in the commissioner's report, which is carried over for a period of three centuries, are arrived at in this manner and show that the home consumption for the past century would be 24,883,966,000 tons, for the second century 30,087,744,000 and for the third century 30,466,981,000 tons; making a total home consumption for the three centuries from the years 1901 to the year 2200 of 85,438,691,000 tons, an amount over 15,000,000,000 tons under the estimated quantity of coal in the proved coal fields.

Manjak Mining.

The following is an extract from a report on the San Fernando manjak field, Trinidad, made by the Government geologist, and published by the *Agricultural News* of Barbados: Specimens obtained from some of the mines in Barbados have enabled comparison to be drawn between the manjak from that colony and from Trinidad. Manjak has been mined in Barbados at greater depths than have been reached as yet in Trinidad, and higher percentages of petrolene are the rule. It appears, however, that this does not depend entirely upon the depths. Barbados manjak has, on the average, a higher percentage of petrolene and a lower percentage of inorganic matter than Trinidad manjak. Consequently it frequently has a lower melting point and a brighter luster. The columnar variety of manjak exists also in Barbados, occurring as a selvage to the veins of lustrous manjak with conchoidal fracture, which, however, is the most prevalent type in Barbados.

Precisely similar phenomena are described as characteristic of the gilsonite veins of Utah. As in Trinidad, the columnar and conchoidal varieties differ in percentages of petrolene. One Barbados specimen, showing both types in contact, was analyzed with the result that the columnar variety gave 18 per cent. and the conchoidal 35 per cent. of petrolene. The loss of volatile matter on exposure to the air is also well exhibited by the Barbados manjak.

As the manjak in the San Fernando field is worked to greater depths, and especially when veins which do not crop out at the surface are mined, it may be expected that material equaling the best type of Barbados manjak in luster and percentage of petrolene will be found.

The Manufacture of Briquets in Germany.

A large part of the lignite produced in Germany at the present time, is made into briquets; and so active has been the campaign of the promoters of the lignite industry, that lignite briquets are now being used for many industrial purposes, for which they were previously considered unsuitable. For instance, lignite briquets are now used in gas producers for open-hearth steel furnaces, and in suction gas generators, whereas a few years ago, they were not considered adaptable for those purposes.

The German production of lignite in 1904 amounted to 48,500,222 tons; in 1905, it was nearly 4,000,000 tons larger. The present year has so far shown a large increase over 1905, and apparently, the control of the fuel market is not to remain entirely in the hands of the bituminous operators. The conversion of lignite into briquets is enabling the operators of lignite mines to transport their product without loss or breakage, and to command a market at a considerable distance from the mines.

In the year 1904-05 the Spanish company, "El Porvenir," continued work in the breccia stratum impregnated with cinnabar at a depth of 120 m. in the Pena mine, and 150 m. in the Esperanza, with the following results; mineral mined, 7433 tons; production of mercury, 1100 flasks; average per centage of mercury, 0.48 per cent. The company paid a dividend of 10 per cent. The mines are at Mieres.

Colliery Notes.

A wire rope used for hoisting should be recapped and reversed every six months.

In building dams or batteries for flushing braker tailings, the manure from the mines when mixed with gob makes a good filter.

In effecting a system of mine ventilation, the installation of overcasts requires a greater initial expenditure, but is more efficient and causes less trouble afterward.

In sinking a diamond drill hole, the flow of water is often lost. If a pint of dried pulverized horse manure be put into the hole before the bit is lowered, the flow of water often will be restored.

Cylindrical screens made of sheets of iron or steel with circular perforations, are preferable to those constructed of wire cloth. The former last longer, size the coal better, and do not clog as quickly.

In designing a reliable and efficient brake for the drum of a winding engine, the power should be applied as near the center of the drum as possible, and a leverage of 150 or 200 to 1 should be given.

The use of rope guides has not been as carefully considered as the subject deserves. The first cost is low, few repairs are required, except to oil regularly, they last longer than wood guides, occupy little space, and are more flexible.

A self-acting incline will generally operate properly and satisfactorily, when the slope is a 5 per cent. grade. In calculating the angle of inclination for such a plane, the friction of the cars should be taken at 1/70 and that of the rope and drums at 1/20.

In flushing anthracite culm into a mine, a 6-in. gas pipe gives good results. When flushing is stopped for the day, the same quantity of water should be allowed to pass through the pipe line 10 minutes for each 1000 ft. of the line, in order to avoid clogging the pipe.

Centrifugal pumps are being more generally used in mine work for moderate lifts, especially when dirty, gritty water has to be disposed of. These pumps have few moving parts in contact, thus reducing wear and tear. They occupy little space and do not require heavy foundations.

The simplest method of testing safety lamps is to take a brass tube of small diameter, similar to a blow-pipe, and by blowing through it cause a current of air to strike against the glass all around the top and bottom edges. If the glass is improperly fitted, the current of air will get in and either deflect the flame, or extinguish it altogether.

A steel cage can be considered as weighing two-thirds the weight of the coal raised. After determining the size of rope necessary, the drum diameter can be safely estimated as equal to 150 times the diameter of rope. After calculating the area of the engine cylinders in square inches, the result should be increased by allowing 20 per cent. for friction.

In gassy mines where nothing but safety lamps are used, the work of cleaning the glasses and gauzes of these lamps is best and most economically performed by machines specially designed for this purpose. The machines are operated by hand or steam power, and the gauzes are not only more thoroughly cleaned, but also are subjected to less rough treatment.

In order that the glasses on safety lamps shall form tight joints where they come in contact with the metal rings, it is best to use washers made of asbestos millboard, which gives a good bearing surface to the edges of the glass. Washers of india-rubber or leather should not be used as they are perishable, and so easily affected by heat that they often shift their position and cause a leak.

In calculating the size and strength of a hoisting engine for a shaft, it is important to remember that the dead load which has to be overcome at the beginning of the wind, requires more power to move it, than is necessary, subsequently to keep it in motion. In order to leave sufficient margin, it is best to consider the load as equal to the combined weights of the coal raised, the rope, the cage, and the cars.

On a self-acting plane, when the inclination exceeds 45 deg. much trouble is experienced in attempting to keep the cars on the track when the trips are run at a fair speed; it is also difficult to keep part of the coal from falling out of the cars. These disadvantages are corrected by constructing and using a carriage which will carry from two to six cars, and enable these loads to assume a horizontal position.

Comparing wrought iron and steel pipes with those made of cast iron, the former are cheaper and more easily handled, while sections can be readily cut off and fitted wherever required. Actual practice, however, has proved that, when dirty or acid water has to be dealt with, the cast iron pipes are most suitable. Pipes of large section possess greater strength when made of mild steel, which is more homogeneous than when made of wrought iron.

A new apparatus has been devised for the detection of minute quantities of fire-damp. When this latter gas is present in such a small quantity as 0.04 per cent. of the air in the mines, the device is said to register satisfactorily. The apparatus takes advantage of the law of diffusion of gases, and of the difference between the density of fire-damp, which is 8, while the density of air is 14.4. This calls into operation the law of diffusion of gases, which is that gases permeate through a porous substance inversely as the square root of their densities.

At every colliery there should be a special signal for accidents, indicating the level or part of mine at which it has occurred. On receipt of this signal, the stretcher equipment, together with other safety appliances could be hurried to the proper place and prevent unnecessary suffering and inattention. The stretcher now approved for use in such cases is so constructed that the injured person will not be disturbed even when the stretcher is conveyed over rough places, or on an incline road. The horizontal position being maintained.

At every colliery where a shaft is employed, it is necessary, for the safety of the men, to see that properly constructed gates protect the shaft opening, both on the surface and the underground. In addition to this protective measure, it has been found advisable to adopt a more perfect arrangement for the protection of the ends of the cages when men or cars are being raised or lowered in the shafts. An automatic device has been recently installed at several collieries, whereby a lifting lever attached to the cage engages a catch bar when the load is nearing the top or bottom, and the fences on the cage are raised at the proper time.

In considering the use of a natural siphon system for draining a swamp in any mine, it is necessary to remember that under no circumstances should the siphon be expected to lift the water over an intervening vertical hight of more than 26 ft. The 33 ft. lift that theoretically appears possible is reduced by about 7 ft. because of the friction of the water in the pipes. An arrangement of this kind acts best when the vertical hight does not exceed 20 or 22 ft. It is also essential that the diameter of the pipes be large enough to allow the water to flow with a velocity that reduces the friction to a minimum. Experience also suggests that the pipes should be laid on a regular gradient, from the sump to the highest point, and that the joints should be packed with lead in order to render them thoroughly air-tight.

Endless rope haulage has many advantages when compared with the tail-rope system as installed under ordinary conditions in a mine. The endless rope system requires few attendants; and (because of the slow speed at which it can be operated) reduces to a minimum the risk of breakages, accidents, and wear on machinery and cars. If the loads are attached at equal distances apart, the weight of the rope is carried along with less friction on the ground and pulleys, and a continuous supply of cars is brought to the pit-bottom or to the surface. In a road where the inclination is variable, the load is distributed to better advantage; the empties, going in, assist the engine to haul the loads out. Another advantage is the lengthened life of the rope, which in endless rope haulage is proved to be at least twice as long as in tail-rope haulage.

Metallics.

The best kind of belt lacing is cement.

The production of Portland cement in the United States in 1905, according to the United States Geological Survey, amounted to 35,246,812 barrels, valued at $33,245,867, this being an increase of 8,740,931 barrels over the output of 1904.

In first-class work with short connections and few joints between the steam turbines and condensers, it is now possible to obtain a vacuum within 1 in. of the barometer reading at the time. This can be done without difficulty, the cost of auxiliary apparatus required to produce it being the only commercial detriment.

The water added to lime in the process of slacking forms a true chemical compound $Ca(OH)_2$, so that if the exact equivalent amount of water is added, the resulting hydroxide is a perfectly dry powder. This powder is easily formed into a paste of any desired consistency by the addition of more water.

In stoping in a narrow vein, the drills are frequently rigged up on a crossbar, which enables the muckers to tram beneath them from another part of the level, while drilling operations are going on. However, whenever it be convenient, the miners prefer to rig upright, as they can drill more advantageously from that position.

Alloys of certain metals can be formed by electric deposition. Thus copper and zinc may be deposited by electrolysis to form brass and all the beautiful bronzes and alloys of the Japanese can be obtained by electrolytic deposition. By suitable admixture of gold, silver and copper, red gold, rose colored gold, or green gold may be deposited.

The advantages of the milling or "glory hole" method of mining are as follows: Practically no expense for timber; no bad air to work in, and therefore no time lost; few drill holes needed and comparatively little powder used; the ore is handled mostly by gravity. The disadvantage is that there is a limit to the depth at which the ore can be excavated, because of the sides.

The first step in the reduction of a tin ore consists in extracting other metals, the reduction of which would spoil the good qualities of the tin. Ores containing sulphides and arsenides are subjected to an oxidizing and volatilizing roast before they are smelting for the reduction of tin. If large quantities of iron and copper sulphide are present, the oxidizing roast is made sulphatizing so that these two metals may be removed as sulphates by leaching.

No building can be properly heated unless some provision be made for heating the air which is introduced into the building. For this reason steam pipes located below the windows are more efficient than those placed in any other position, as there is always more or less leakage about windows, and if there are steam pipes below them, the warm air rising past the window will blend with any cold air and result in uniform heating.

In drilling the holes in the face of a stope they must be placed so as to bring down the ore to the best advantage, i.e., enough holes must be drilled and enough powder used to break the ore to convenient size for economical handling. If the ore be broken too fine, this often leads to waste of time in shoveling it into the chutes; while, if it be broken down in the form of large boulders, it will be necessary to blast them. Rocks of 25 to 50 lb. are conveniently handled.

The loss of heat units in the chimney or stack, running as it does, to 20 and 25 per cent., is almost always due to the admission of too great a quantity of air through the combustion chamber, which results in cooling the furnaces, as well as setting up initial strains in the boilers. Holes in the fire are produced, especially with mechanical stoking, and unless the stoker himself pays attention to the operation of the mechanical device, these openings are liable to admit too great a proportion of air.

The crystallization of metals is a matter of great importance, since the formation of crystals, due to vibration, extreme cold, sudden alterations of temperature, or the presence of impurities, may render a metal useless. Crystallization may serve to indicate the quality of a metal, as in the case of foundry pig-iron; to indicate the presence of impurities, as in the case of the film of antimony produced on lead that is refined by steam; or lastly, to separate metals on a large scale, as is the case in Pattinson's process of desilverizing lead.

It has often been proposed to substitute electrolytic methods for the wasteful and unhealthy smelting processes now employed in reducing mercurial ores. The only process in which electricity enters, applicable to the reduction of mercurial ores, will consist of a chemical solution of the mercury, followed by electrolytic separation. Few results along this line have yet been obtained, but it is noteworthy that cinnabar is readily soluble in solutions of alkaline sulphides containing hydroxides of the alkaline metals, and mercury may be precipitated quantitatively by the electrolysis of such a solution.

Cadmium is nowhere recovered except as a by-product in zinc metallurgy. In the reduction of roasted zinc ores it comes off from the furnace with the earliest product of distillation, and it is chiefly found mixed with zinc dust in the prolong. This substance, usually colored brown by the oxide of cadmium, is repeatedly reduced and redistilled, the first portions condensed always containing the largest proportion of cadmium. When sufficiently freed from zinc, the metal is cast into rods. The apparatus employed is similar to that used in the extraction of zinc, but the retorts are smaller and are made of cast iron.

On solidification after melting, metals usually crystallize. Crystallization also occurs when metals are condensed from a state of vapor, or are deposited out of solutions. Metals most frequently crystallize in the cubic system. This is the case with platinum, gold, silver, copper, lead, and iron, and probably with tin and zinc. Tin also crystallizes in the hexagonal system, and the iron-manganese carbide, spiegeleisen, crystallizes in the rhombic system. Antimony, arsenic and zinc crystallize in the hexagonal system, while bismuth crystallizes in rhombohedra resembling cubes. As seen above, tin and zinc are dimorphous—that is, they may be developed according to two systems of crystallization.

Track laying is a very important matter in the economy of a mine. A good track will always pay for itself many times over. The tracks should not only be good but also there should be plenty of them, and placed so that they will be close to the rock to be removed. In drifts, movable lengths of 8 or 10 ft. should be used. This saves shoveling to a long distance by placing them in position as soon as there is room, and enables the mucker to work to advantage, until there is sufficient space for the ordinary 16-ft. or 20-ft. rails. The rails should be laid on 4x6-in. ties, 3 ft. in length. Rails weighing 16 or 20 lb. to the yard should be used. The heavier the rail, and the heavier the crossties, the better will be the track.

The three principal operations involving thermal treatment are annealing, hardening, and tempering, and these three are intimately related. Of all the metals, steel is one which can be most seriously and advantageously modified by heat treatment. As applied to steel, hardening is the result of a rapid cooling of a strongly heated mass of metal. Tempering consists in re-heating a hardened steel to a temperature much short of that to which it was raised before hardening; this heating may or may not be followed by rapid cooling. Annealing consists of heating the steel to a temperature higher than that used for tempering, and allowing it to cool slowly. These principles may be illustrated by three strips of steel of identical quality. It can be shown by bending one that it is soft; but if it is heated to redness and plunged into cold water it will become hard and break on any attempt to bend it. The second strip may, after heating and rapid cooling, be again heated to about the melting point of lead, when it will bend readily, but will spring back to a straight line when the bending force is removed. The third piece may be softened by being cooled slowly from red heat; this will bend easily and will remain distorted.

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*Illustrated.

Notice of Consolidation.

This concern has purchased the *Mining Magazine*, which will be consolidated with the ENGINEERING AND MINING JOURNAL, August issue. The new and enlarged monthly issue of the ENGINEERING AND MINING JOURNAL will contain the "Mining Index" and all other desirable features of the *Mining Magazine*.

All subscribers to the *Mining Magazine* will be added to the JOURNAL list, and the monthly issue of the JOURNAL will be sent to them in lieu of the *Mining Magazine*.

In the case of subscribers whose names appear on both lists, the expiration date will be put forward on the JOURNAL list, corresponding to the number of issues due on the *Magazine*.

All amounts due the *Mining Magazine* on subscription should be forwarded to the ENGINEERING AND MINING JOURNAL, 505 Pearl street, New York, and all amounts due for advertising should be sent to W. J. Johnston, 135 William street, New York.

The Mining Industry of Canada.

The Dominion of Canada has long possessed a thriving mineral industry, the records of gold mining in Nova Scotia and of coal mining in Cape Breton going back for many years, as do also the records of gold mining in British Columbia. During the eighties, nickel-copper mining in the Sudbury district of Ontario began to attract attention, and in the early nineties there was a boom in silver-lead mining in British Columbia, which gained for that portion of the Dominion the name of "The Mineral Province." The right to that title was sustained by the opening of the great lodes of the Rossland district, and by the far greater ones of the Boundary district, where one mine at least, the Granby, has been proved to possess one of the most remarkable copper deposits of the world, extraordinary not only for its great magnitude, but also for the conditions which enable mining and smelting to be performed at costs that are close to the lowest on record. The discovery of the rich placers of the Yukon Territory added a new mineral-producing region to the Dominion.

In spite of the importance of the deposits of nickel-copper ore of Sudbury, which are believed to possess greater resources of nickel than any other district of the world, and have given Canada a commanding position in the nickel industry, the mineral resources of the great expanse of the Dominion between New Brunswick and Nova Scotia on the east, and British Columbia on the west, have heretofore received only scant attention, exploration having been largely sporadic and conducted in only a few scattered localities.

The comparatively recent discovery of the extraordinarily rich veins of silver ore at Cobalt, in Ontario, which attained great prominence in 1905, has served to attract renewed attention to the mineral resources of that great province, and has already led to a mining boom of more picturesque features than anything previous in the mining history of Canada, except of course the Klondike.

Besides the interest in the Cobalt district, Canada has recently been attracting considerable attention because of several promising metallurgical novelties that have been the subject of much experiment. Among these are the elaborate tests upon the electric smelting of iron ore, which have recently been conducted by Dr. Haanel at Sault Ste. Marie; the results of these are summarized in an article published elsewhere in this issue. It is evident that electric smelting is only possible where hydro-electric energy can be produced at a cheap rate. As regards the production of pig iron, both Ontario and Quebec are favorably situated, possessing many water powers, which at present are useless for any other purpose, and can be developed to furnish power at the rate of $4 to $5 per horse-power per year. Under these favorable conditions the electric smelting of iron ore may become a commercial success.

The experiments conducted at Sault Ste. Marie have already had a direct commercial result, the Lake Superior Corporation having purchased the electrical plant installed for them, and having used it since March 7 for the production of ferro-nickel pig. The furnace has been in continuous operation since that date, the men employed being those who were trained in the experiments conducted by the Government. Because of the high value of the product, the company finds it profitable to convert its stock of briquetted roasted pyrrhotite into pig, even with the small furnace, which necessarily

entails a heavy labor charge per ton of product. According to the accounts received, the furnace has been working satisfactorily and uniformly.

Another interesting innovation in the metallurgical industry of Canada was the beginning of operations by the Canadian Metal Company, which has erected an expensive zinc smelting plant at Frank, Alberta, the purpose of which is to treat the zinc ores of British Columbia, especially of the Slocan district. The plant was located at Frank, on the Crow's Nest branch of the Canadian Pacific railway, because coal is cheaply available at that point. The company, indeed, owns a coal mine, operated through an adit, the cars of which dump the fuel directly into the bunkers of the gas producers. The plant was put in operation on May 31, and on June 3 spelter was drawn from the condensers of the distillation furnaces, this being the first spelter ever produced on a commercial scale in Canada.

The Situation in Copper.

Copper began the month of June at 18⅜@18⅝, for electrolytic, and remained steady until the 19th, when a slight recession in price occurred, the market finally settling down to 18¼@18½, and then to 18⅛@18⅜ at which range it closed. The average price for the month was 18.442. The slight reaction does not betray weakness in the market, but merely a passing of the urgency on the part of some consumers, which prevailed during April and May.

At the beginning of this year the demand for copper was slack, consumers having fully covered their requirements during the excitement of the last month of 1905, some of them, indeed, having over-bought. As the dullness continued, different views as to the future of the market developed. Some producers believed that the climax had been passed and made sales at continuous concessions. Other producers, including many of the largest, were confident that the situation was fundamentally strong and that after a period of digestion the consumers would be obliged to reenter the market and pay their asking price, which was 18½c., delivered 30 days, or about 18 5/16c., cash, New York. As it turned out the latter view was correct, the consumers appearing in the market again toward the end of February and bidding the price up not only to the asking price of the large producing interests, but also, before long, beginning to manifest a willingness to cover their requirements for many months ahead at that price. On the other hand, the producers displayed great moderation, making no effort to advance the price further, which later on they could readily have done, but rather aiming to establish a steady market, which would hold well toward the end of the year, or as long as possible. There has been no combination among the producing, or rather the marketing, interests to carry out this policy, but each one, acting independently, has conformed to it in a general way.

Along toward the middle of the spring the demand of foreign buyers, who do not cover their requirements so far ahead as the domestic, together with that of some belated consumers here led to an advance in the price for prompt and nearby shipments, which raised the general average of the market to 18⅜@18⅝. There was sufficient copper available to meet these requirements without bringing about any further advance. In fact, more copper appears to have been reserved for such purposes than was actually needed, and when about the middle of June the speculative decline of standard at London unsettled conditions abroad and the home demand for prompt shipment became less urgent, the price naturally settled back to the holding figure established in the early part of the year and maintained continuously for a large part of the consumption.

At the present time, there is nothing to indicate any flaw in the general soundness of the situation. There has been an increase in the domestic production of copper during the last six months, but nowhere near so large an increase as was foretold during the early months. The production has been estimated in the trade as indicating a total for the year of 940,000,000 to 950,000,000 pounds. The production in 1905 was 871,634,245 pounds (the accuracy of which figure we maintain, although the Geological Survey reports a considerably higher figure). We think that the estimate of 940,000,000 to 950,000,000 pounds for 1906, so far as indicated by the first half of the year, is reasonable, it corresponding to a gain of about 8½ per cent. over 1905, whereas 1905 showed a gain of about 6½ per cent. over 1904. However, the supply of foreign copper has increased at a somewhat larger ratio.

On the other hand, domestic consumption has undoubtedly increased largely, but this has been partially offset by a smaller volume of exports. It is to be remembered that the great demand from China, which was so potent factor in the export trade of a year ago, is no longer existant. Any attempt to outline the statistical position at the present time can be nothing but a matter of surmise. However, it appears to us to be strong; so far as we are aware there is no evidence of accumulation of stocks in first hands.

The Pennsylvania Miners' Certificate Law.

The Pennsylvania Supreme Court has given its decision this week in what is known as the Shaleen case. This was a test case, affecting the validity of the miners' certificate law, under which no man can work as a miner in the anthracite mines without a certificate from the board of examiners of the district. A condition prior to the issue of such certificate is two years' work as a mine laborer in the anthracite mines of Pennsylvania.

The case was first tried in the Lackawana county court, where action was brought against one John Shaleen for working without a certificate. The court affirmed the law in all points, and appeal was taken to the Superior Court, the fight being carried on really by the Delaware & Hudson Company, as a representative of the anthracite companies generally. The Superior Court upheld the law in part only; that is, it decided that the requirement of a certificate was within the police power of the State. It held, however, that the condition requiring service in the mines of Pennsylvania was void, as being in contravention of the fourteenth amendment to the Constitution of the United States, in that it made a discrimination against citizens of other States, refusing to count experience in the mines of those States.

The Supreme Court has now reversed the decision of the Superior Court, and upholds that of the court of first instance, that all the provisions of the law are valid. The point made is that the law does not discriminate, as claimed, since citizens of other States are free to enter the mines of Pennsylvania, and to acquire the neces-

sary experience there. It is possible that, as the main point in the case relates to a provision of the Federal Constitution, an appeal may be taken to the United States Supreme Court; but it is not certain that this will be done.

Had this decision been rendered three months ago, it might have had an effect on the strike of the anthracite miners. The knowledge that under the Superior Court's interpretation the anthracite companies could bring in miners from other States—and the belief that they were preparing to do so—was a factor in bringing the United Mine Workers to the settlement which was finally made in the anthracite region. The result might have been different if miners from outside had been barred by the law, as they were in 1902, and as they are now, under the present decision.

The Corrosion of Iron and Steel.

At the recent meeting of the American Society for Testing Materials at Atlantic City, N. J., the subject of the relative corrosion of iron and steel commanded a large share of the attention. On this matter there is a wide difference of opinion, and when such disagreement exists, the subject being an important one, the conditions are ripe for a profitable discussion. In this case, the discussion is based not only upon a difference in opinion as to the causes, etc., but also a fundamental difference in opinion as to the facts. Many observers hold that steel corrodes more rapidly than wrought iron; some of the evidence presented at the recent meetings was very positive in this respect, and equally important evidence was offered recently in the Transactions of the American Institute of Mining Engineers, in Mr. Roe's paper on "Wrought Iron," and the discussion of that paper which ensued. On the other hand, there are many who deny flatly that steel does corrode more rapidly than wrought iron.

Prof. Henry M. Howe read a paper on this subject at the meeting of the American Society for Testing Materials, and in the first paragraph of his paper, gives a concise and illuminating summary of the status of opinion in the case. He said:

"On the one hand we have the very general public opinon that steel corrodes not only faster, but very much faster than wrought iron, an opinion held so widely and so strongly that it can not be ignored. Smoke does not prove that fire exists; but such strong smoke bids us look carefully for fire. On the other hand we have the results of direct experiments by a great many observers, in different countries, and under widely different conditions; and these results certainly tend to show that this popular belief is completely wrong, and that on the whole there is no very great difference between the corrosion of steel and wrought iron. Under certain sets of conditions steel seems to rust a little faster than wrought iron, and under others wrought iron seems to rust a little faster than steel. Thus, taking the tests in unconfined sea water as a whole, wrought iron does constantly a little better than steel; and its advantage seems to be still greater in the case of boiling sea water. In the few tests in alkaline water, wrought iron seems to have the advantage over steel, whereas in acidulated water, steel seems to rust more slowly than wrought iron."

Professor Howe remarks that greater weight is naturally to be given to the numerical results of careful, direct, comparative tests than to rumor and popular belief. However, he admits that while the latter has the disadvantage of lacking direct, numerical, comparative data, it has the very great advantage of being based on the actual conditions of use, more closely and often far more closely, than are our direct comparative tests, unless the latter are planned with very great care. This is, of course, the proper spirit of scientific investigation. In the remainder of his paper Professor Howe points out reasons why the observation of facts may differ from the results of experiments. For example, sheet-steel roofing may rust faster than iron, because it holds the paint better, and yet steel in other forms, like tubing, may rust no faster than wrought iron. Moreover, the difference between steels is to be emphasized. Carelessly made steel, containing blow holes, may rust faster than wrought iron, while carefully made steel, free from blow holes, may rust more slowly. Steel is generally richer than wrought iron in cementite, the iron carbide (Fe_3C). This may have a difference upon the behavior of the two metals.

The subject is an open one, and will be fruitful of further discussion. The popular belief in the greater resistance of wrought iron is certainly very strong, and is based on much positive evidence. Such evidence as was presented by Mr. Roe in the paper to which we have previously referred is very impressive. It is gratifying to know that the whole subject promises to be thoroughly thrashed out by the experts of such a society as that which recently met at Atlantic City.

Acid and Basic Steel.

The London *Statist*, usually very careful, falls into serious error in commenting on steel production. It says that in the United States, as in Germany, the quantity of basic steel made far exceeds that of acid steel, because our ores do not make pig iron suitable for use in the acid process.

The fact is that our mines produce a very large quantity of ore which is classed as bessemer ore. It is true that of the open-hearth steel made last year in the United States 87.1 per cent. was basic steel; but all our converter steel is made by the acid process. Of the 20,033,751 tons of steel of all kinds made in the United States in 1905, a total of 12,218,023 tons, or 61 per cent., was made by the acid process; 7,815,728 tons, or 39 per cent., being basic steel. The basic process may lead at some time in the future, but it is far from doing so now.

Formosa Gold.

Notwithstanding the strain of the recent war, the Japanese have been diligently exploiting the resources of the island of Formosa, which they acquired as a result of the war with China. It has long been known that the resources included gold, and there is now a steady production. Three companies are operating mines, mills and cyanide plants, and some placer workings are also reported. They are all Japanese enterprises and have been successful, the total gold production of the island in 1905 having been over a million dollars.

BECAUSE OF LACK of space in this issue, which is largely devoted to mining in Canada and certain South American countries. it has been necessary to omit the third article of the series on the Wisconsin lead and zinc region. This series will be resumed in our next issue.

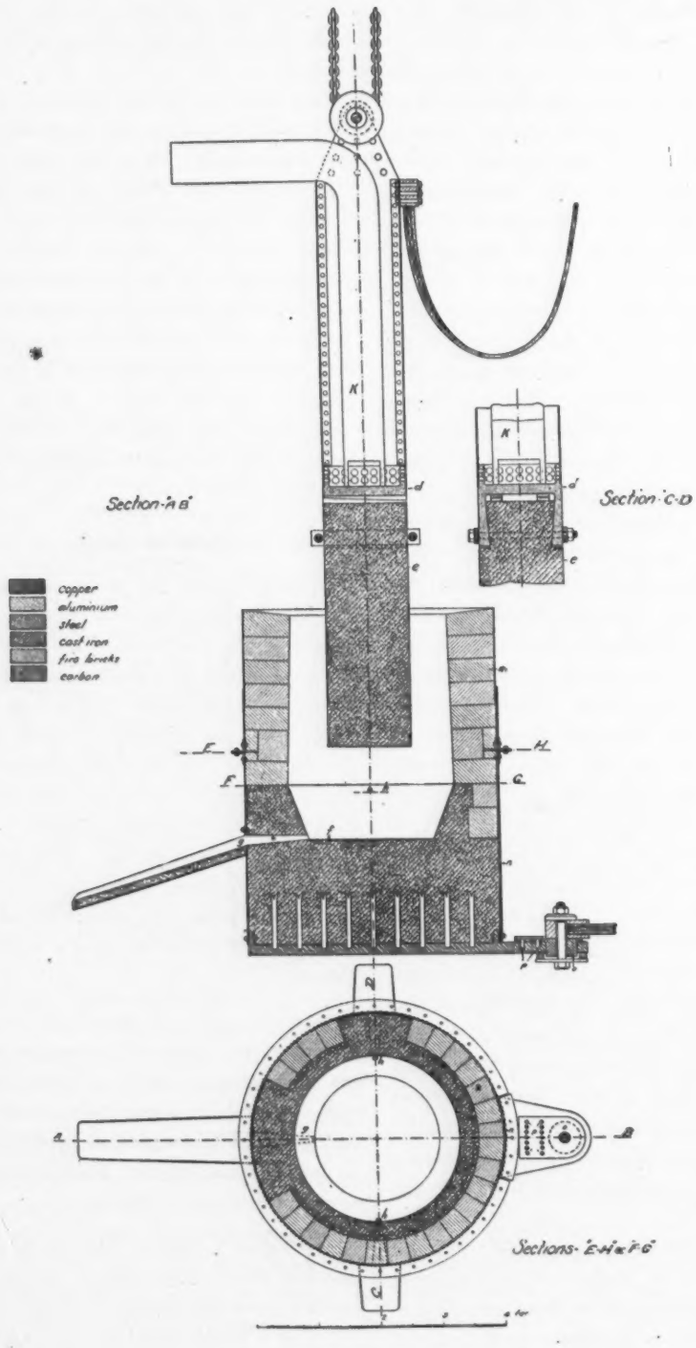
Dr. Charles S. Palmer, who has been an associate editor of the JOURNAL during the last two years, has resigned from the staff, and after a much-needed vacation expects to enter upon editorial work in another line.

Electric Smelting of Iron Ore.

BY PHILLIPS THOMPSON.

The summarized report prepared by Dr. Eugene Haanel, and just issued by the Mines Branch of the Canadian Department of the Interior, gives the general conclusions arrived at in connection with the Sault Ste. Marie experiments in electric smelting, in addition to presenting in a detailed form the results of the more important and interesting tests made. The work was undertaken with the object of establishing with some degree of exactitude the amount of electric energy required per ton of product, and also to decide the following points, which were either not covered or left in doubt by tests witnessed at Livet, France, by the Canadian Commission on their visit to Europe: (1) Can magnetite be successfully and economically smelted by the electric process? (2) Can iron ores with comparatively high sulphur content, but not containing manganese, be made into pig iron of marketable composition? (3) Could the process be so modified that charcoal could be substituted for coke as a reducing agent?

It was felt that upon the solving of these problems depended the feasibility of introducing electric smelting into Canada, as an economic process, since magnetite is the chief iron ore and charcoal and peat coke are home products, while coal-coke for metallurgical purposes must be brought from a distance into Ontario and Quebec.



EXPERIMENTAL ELECTRIC FURNACE.

The furnace used in the experiments was designed by Dr. P. Heroult, who made the tests. It consists of an iron casing bolted to a bottom plate of cast iron 48 in. in diameter. The casing was constructed in two cylindrical sections to facilitate repairs. Carbon paste was rammed into the lower part of the furnace up to the bottom of the crucible. The lining consisted of common firebrick, which, from the bottom of the crucible up for a distance a little above the slag level, was covered with carbon paste to the thickness of a few inches. The crucible therefore consisted entirely of carbon. The lining of the furnace was given the shape of a double-cone set base to base. Changes in the dimensions of the interior were made from time to time as indicated by experience, but for the majority of the experiments they were as follows: Diameter of bottom of crucible, 24 in.; hight of lower cone, 11 in.; hight of upper cone, 33 in.; diameter of joint base of two cones, 32 in.; diameter at top of furnace, 30 in. The electrodes, manufactured by the Heroult process and imported from Sweden, were prisms of square cross-section 16x16 in. by 6 ft. long. The contact with the cables carrying the current to the electrode consisted of a steel shoe, riveted to four copper plates, which ended in a support for a pulley. The electrode, with its contact, was supported by a chain passing under the pulley, one end being fastened to the wall, the other passing over a winch operated by a worm and worm-wheel. The electrical energy was furnished by one phase of a 3-phase 400-kw., 30-cycle 2400-volt alternating current generator coupled by belt to a 300-h.p., 500-volt direct current motor. A current of 2200 volts was delivered to an oil-cooled transformer of 225-kw. capacity, designed to furnish current to the furnace at 50 volts. The transformer was placed in a separate room close to the furnace, and thence the current was led to the bottom plate contact of the furnace, and to the electrode contact, by conductors consisting each of 30 aluminum cables 5/8 in. in diameter. The measuring instruments employed comprised a volt-meter, an ammeter, a power-factor meter and a recording watt-meter.

Many preliminary experiments had to be made in order to adjust the capacity of the furnace crucible to the available

energy and to determine the shape to be given to the interior to insure easy passage of the charge into the reducing and melting zones. Attempts were also made to utilize the calorific energy of the carbon monoxide generated by the reduction of the ore, which in all previously recorded experiments had been wasted. This, however, was not found practicable, owing to the construction of the furnace. The official experiments began about the middle of January, continuing night and day with a few intermissions until March 5, and during this time about 150 casts were made, yielding about 55 tons of pig iron. Eight classes of ore were treated, five of magnetite from the Wilbur, Blairton, Calabogie Mining Company, Perth, and the Calabogie mine, Lanark; one of hematite, Negaunee; one of roasted pyrrhotite from the Lake Superior Corporation, and one of titaniferous ore from Quebec. The materials for the charge—ore, flux and carbon—were crushed to pass through a ¾-in. ring and roughly mixed.

Full details are given of seven of the runs made, including analyses of the raw material and the product of each, the length of time required and the amount of electric power employed, etc. It was expected that considerable difficulty would be experienced in the smelting of magnetite, on account of its conductivity. With charcoal as a reducing agent, no trouble was experienced in this respect, nor was the inductance of the furnace increased by the presence of magnetite. So admirably adapted was charcoal, when crushed to pass a ¾-in. ring, as a reducing agent in the electric furnace, that coke and briquets of coke with clay were abandoned, and all the experiments with magnetite and roasted pyrrhotite described were made with charcoal. Some of that used was of poor quality which, together with the fact that a quantity was consumed on top of the furnace, account for the large quantity used per ton of product. A modification of the furnace protecting the upper layer of the charge from the atmosphere and the use of properly carbonized charcoal would decrease considerably the amount required.

For the production of 42,711 lb. of pig iron, 384 lb. of electrode were consumed, the same electrode having been in commission for 13 days, making the consumption of electrode per ton of pig iron 17.98 lb. The consumption of electrode was found to be greater for white iron than for gray iron. The power factor of the furnace was determined by Charles Darrall, of the Canadian Westinghouse Company of Hamilton, Ont., and was found to be 0.919. This high power factor was due to the construction of the furnace casing, which prevented the closing of the magnetic lines of force.

Probably the largest unit which can at present be constructed on the model of the experimental furnace will not exceed 1500 h.p. The following modifications in the experimental furnace will be required to fit it for the production of pig iron on a commercial scale:

1. The top should be modified to permit of the application of labor-saving machinery for charging.

2. Provision should be made for the collection and utilization of the carbon monoxide produced by the reduction of the ore; this involves also the protection of the charcoal from combustion on top of the furnace.

The greater capacity insuring less loss of heat by radiation, and the modification permitting the utilization of the carbon monoxide will materially increase the output beyond that ascertained by the experimental furnace. The experiments indicated that under normal conditions about 11.5 tons were produced by an expenditure of 1000 e.h.p. days. It is therefore not unreasonable to assume that under similar conditions, with a properly constructed plant, the output per 1000 e.h.p. days would reach 12 tons; and this figure has been adopted in calculating cost of production per ton of pig iron. On account of the value of the product the smelting of roasted nickeliferous pyrrhotite by the electro-thermic process as carried out with the experimental plant, admits of immediate commercial application, without other modification of the furnace than increase of its capacity.

The cost of construction of a 10,000-h.p. plant capable of producing 120 tons of pig iron per 24-hour day is estimated at $700,000. Amortization, depreciation and interest being reckoned at 5 per cent. each, or 15 per cent. in all, on the cost of construction, give $105,000 as the annual expense of plant. On a production of 43,200 tons of pig iron per year of 360 days this item amounts to $2.43 per ton.

The total cost of production per ton of pig iron is calculated as follows:

Ore (55% metallic iron) at $1.50 per ton	$2.70
Charcoal, ½ ton at $6 per ton	3.00
Electric energy, amortization, etc	2 43
Labor	1.00
Limestone	0.20
Electrode, 18 lb. at 2c per lb	0.36
General expenses	1.00
Total	$10.69

The results of the experiments are summarized as follows:

1. Magnetite can be as economically smelted by the electro-thermic process as hematite.

2. Ores of high sulphur content, not containing manganese, can be made into pig iron, containing only a trace of sulphur.

3. The silicon content can be varied as required for the class of pig to be produced.

4. Charcoal which can be cheaply produced from mill refuse, or wood, which could not otherwise be utilized, can be substituted for coke as a reducing agent, without being briquetted with the ore.

5. A ferro-nickel pig can be produced, practically free from sulphur and of fine quality, from roasted nickeliferous pyrrhotite.

6. The experiments made with a titaniferous iron ore containing 17.82 per cent. titanic acid permit the conclusion that titaniferous iron ores up to perhaps 5 per cent. titanic acid can be successfully treated by the electric process.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The First Tube Mill.

Sir—Replying to your correspondent "A Cornishman," in your issue of June 16, I may say that the construction and operation of the mill referred to by him differs essentially from the mill referred to by me.

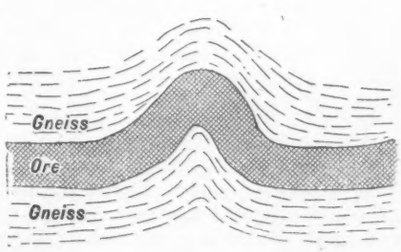
The 2.5-ft. revolving cylinder is not a continuous feed and discharge mill in which the coarse material is fed into the machine at one end and discharged at the other; nor is it a pebble mill suited for fine grinding as used in modern practice, but it is a tumbling barrel containing iron scraps, which owing to its inefficiency has not been adopted in the many mining districts to which Cornishmen immigrate and to which they have taken and practiced many valuable ideas obtained from the experience of centuries in their native country.

R. F. ABBE.

New York, June 22, 1906.

The Mineville Magnetites.

Sir—In the issue of the JOURNAL of May 12, page 891, there are some sketches showing the probable development of the peculiar shaped orebody at Mineville. At the Cheever mine, near Port Henry, the intermediate stage of folding is beautifully shown in two instances and coincides almost exactly with the third stage as shown in the sketches. An actual sketch of the fold there, is about as shown in the accompanying illustration.



It seems as if this folding sufficiently developed would easily result in the inverted ox-bow shape shown by the Joker-Bonanza body; also, if the folding were

sufficiently severe, that the limbs of the fold could join as is shown in section 1000 S., on page 987, of your issue of May 26.

I am of the opinion that these instances go far toward proving that these deposits were once flat-lying beds. The gradation of the gneisses almost imperceptibly into graphite limestones, which is also shown at the Cheever, would seem to point to an original sedimentary origin of the whole series, excepting, of course the gabbro and trap. W. L. CUMINGS.

South Bethlehem, Pa., June 17, 1906.

New Publications.

"Bulletin of the Geological Institution of the University of Upsala." By H. Sjogren. Pp. 280; illustrated. 6½x10 in.; paper. Upsala, 1905; Almquist & Wiksells Book Company.

"Clays of Virginia." Bulletin No. II, Department of Agriculture and Immigration. By Heinrich Ries. Pp. 184; illustrated, 6x9 in., paper, Richmond, Va., 1906: Geological Survey of Virginia.

"The Tertiary and Quaternary Pectens of California." (Professional Paper No. 47, U. S. Geol. Survey). By Ralph Arnold. Pp. 264; illustrated. 9x12 in.; paper. Washington, D. C., 1906: U. S. Geological Survey

"Hydrography of Virginia." Bulletin No. III, Department of Agriculture and Immigration. By N. C. Grover and R. H. Bolster. Pp. 223; illustrated, 6x9 in., paper. Richmond, Va., 1906: Geological Survey of Virginia.

"The Underflow in Arkansas Valley in Western Kansas" (Water-Supply and Irrigation Paper, No. 153, U. S. Geol. Survey). By Charles S. Slichter. Pp. 90; illustrated. 6x9 in.; paper. Washington, D. C., 1906: U. S. Geological Survey

"A Preliminary Reconnoissance of the Mancayan-Suyoc Mineral Region, Leparto, Philippine Islands" (Bulletin No. 4, Philippine Mining Bureau). By A. J. Eveland. Pp. 58; illustrated. 6x9 in.; paper. Manila, P. I., 1905: Philippine Mining Bureau.

"Underground Water in the Valleys of Utah Lake and Jordan River, Utah," (Water-Supply and Irrigation Paper, No. 157, U. S. Geol. Survey). By G. B. Richardson. Pp. 81; illustrated. 6x9 in.; paper. Washington, D. C., 1906: U. S. Geological Survey.

"The Electrolysis of Fused Salts; Part III. Electromotive Forces." (Vol. xxii., "Monographs on Applied Electro-chemistry"). By Richard Lorenz. Pp. 322 + xviii; with illustrations and index. 6½x 9½ in.; paper. Halle, Germany, 1906: Wilhelm Knapp.

"Mining Operations in the Province of Quebec for the year 1905." By J. Obalski Chief, Bureau of Mines. Pp. 43, 8x10 in ; paper. Quebec, 1906. Department of Colonization, Mines and Fisheries.

The report contains a description, geological and mineralogical, of the new Chibogomo mining districts.

"Nepesta Folio" (No. 135, U. S. Geol. Survey). By Cassius A. Fisher. Pp. 5; 3 charts. 18x22 in.; paper, 50c. Washington, D. C., 1906: U. S. Geological Survey.

This folio, which matches No. 36 (Pueblo Folio) on the west, describes Cretaceous, Tertiary, and Quaternary terranes, on the Arkansas river, near Fowler, Colo.

Professional Papers.

Coal Testing. John Halliday. *Elect.*, (London), April 13, 1906. Pp. 1054-56.

Cements and Hydraulic Limes. I. Bottom. *Bull. de la Soc. de l'Ind. Minerale,* T .V. (1906), I. Pp. 205-272.

Mining in Magallanes, Tierra del Fuego. Jerman Brain. *Boletin* de la Soc. Nac. de min. de Chile. Jan. 31, 1906, Pp. 1-7.

Mining Accidents, Means and Methods of Preventing and Overcoming. H. Schwerber. *Le Genie Civil,* Mar. 31, 1906. Pp. 361-364.

Electric Blasting Apparatus with Special Reference to its use in Coal Mines. W. Maurice. *Elect.* (London). May 18, 1906. Pp. 166-168.

Thermal Waters. "La genèse des eaux thermales et ses rapports avec le volcanisme." Armand Gautier. *Annales des Mines,* 1906. No. 3. Pp. 316-370.

Province of Celendin, Peru, Mineral and Coal Deposits of. F. Malaga Santolalla. *Boletin* del Cuerpo de Ingenieros de Minas del Peru. No. 32, illustrated.

Mineral Production of Quebec.

The report of J. Obalski, chief of the Bureau of Mines of Quebec, gives the following statement of the production of the Province in 1905. The quantities are in short tons of 2000 lb., except where otherwise noted:

	Quantities.	Value.
Bog iron ore	12,373	$ 35,268
Chromic iron ore	8,528	104,565
Copper ore	28,644	128,850
Asbestos	48,960	1,476,450
Asbestic	19,220	31,100
Mica (pounds)	378,560	95,460
Calcined ocher	1,905	22,675
Phosphate	1,475	8,875
Slates (squares)	4,900	21,568
Flag-stones (sq. yds.)	2,930	2,490
Cement (barrels)	254,833	408,000
Granite	.....	120,000
Lime (bush.)	1,000,000	140,000
Bricks	120,000,000	625,000
Stone	.....	530,000
Totals	.....	$3,750,300

There were 5,017 men employed during the year, the wages paid amounting to $1,634,363, and the period of employment from five to 12 months. Two men were killed and two injured, the average of each being 0.4 per 1000 employees.

Iron—There has been no development in the iron mines with the exception of prospects and experiments in connection with the magnetic sands of the north shore of the St. Lawrence. It may, however, be stated that, according to borings beneath low-tide level, those sand deposits extend in certain cases to some distance out and could be dredged where the water is shallow.

The Radnor and Drummondville blast furnaces, worked respectively by the Canada Iron Furnace Company and John McDougall & Co., were in operation for a portion of the year with the following results, in tons of 2000 lbs.; ore charged, 17,514 tons; limestone charged, 2087 tons; charcoal charged, 1,165,659 bu., which produced 6774 tons of pig iron. The ore used consists of bog ore from the counties of Champlain, St. Maurice, Joliette, Nicolet, Drummond and Vaudreuil. Nevertheless, 5140 tons of ore from Ontario were used, so that 12,373 tons of ore mined in the Province of Quebec were used.

Ocher—The Canada Paint Company and the Champlain Oxyde Company worked during the open season at St. Malo, near Three Rivers, in extracting and calcining the natural ocher on the spot. The Canada Paint Company has works at Montreal, where the product is crushed and prepared for the market.

Chromic Iron—The progress in this industry has continued, and the production has greatly increased, while all the methods for mining and concentrating the ore have been improved. The use of electric power by the two leading companies is also an important point to be noted. An attempt has been made to introduce Canada ores on the European market, where they find competitors in the ores of Turkey and New Caledonia. Some shipments have, however, been made to England and to Germany. The concentration of low-grade ores and debris is now very effectively done, and the companies regularly supply concentrates varying between 50 tnd 52 per cent., Wilfley tables being used with success. During the year, the Black Lake Chrome and Asbestos Company was the chief producer, while the American Chrome Company did a little concentration and the Canadian Chrome Company set up concentrtaion plant and works.

Copper—The Nichols and Eustis companies continued to work regularly. The latter put up concentration works to utilize the large quantity of debris that had accumulated for some years. The Ascot mine was slightly worked with a few men, producing a small quantity of good-grade ore which was treated at Capelton. The King mine, Ascot, was sunk deeper, a few men being employed throughout the year, but no ore was shipped. The yield for the whole region was 25,575 long tons, 14,172 of which were shipped to the United States and the remainder treated for sulphur and copper by the Nichols Chemical

Company at Capelton; 245 men were employed during the greater portion of the year.

Asbestos—The asbestos industry has continued to develop with the greatest success. The new uses made of asbestos pulp are very encouraging. The result has been the opening of new mines. At Thetford the Bell and King companies (the latter now the American Asbestos Company) and the Johnston Company worked both mines and mills throughout the year with the greatest activity and the maximum of production. It is proposed to introduce electricity as motive power in the mines and mills, the St. Francis Water-Power Company being prepared to supply it. A new company, the Asbestos Mining and Manufacturing Company, of Providence, R. I., was organized to work a mine on the east half of lot 25, range IV of Wolfestown, formerly opened by S. Peters, of Quebec. With some 40 men the mine has been put in good order and a defiberizing mill is being erected capable of crushing 350 tons of rock a day and provided with the usual machinery: breakers, dryers, separating tables and two cyclones. The mine will be provided with cable derricks, steam drills, etc. The total power employed will be represented by steam boilers with a capacity of 350 horse-power.

The production of asbestos during the year 1905, in tons of 2000 lb., was:

	Tons.	Value.
1st class, crude	1,340	$ 221,325
2nd class, crude	2,258	243,785
Fiber	10,707	386 440
Paper stock	34,655	624,900
Total	48,960	$1,476,450
Asbestic	19,220	31,100

Mica—Mining for amber mica was continued this year in the county of Ottawa by some companies only, as was done last year. The market for amber mica is fairly good, especially for small dimensions, and Ottawa continues to be the center of preparation for mica from Ontario and Quebec mines. The mining companies themselves prepare the mica from their mines at Ottawa and Hull, but the following companies must also be mentioned: The General Electric Company, the Laurentides Mica Company, E. Munsell and others of less importance, who have fitted up works, provided with knives and small tool-machines driven by steam or electricity. A noteworthy fact is that mica is beginning to be shipped regularly to Europe. The production in 1905, representing the quantities shipped, is as follows:

Size.	Pounds.	Value.
1x2	65,666	$ 3,852
1x3	159,562	22,316
2x3	63,206	23,165
2x4	45,170	21 739
3x5	16,332	11,012
4x6	6 368	6,190
5x8	857	786
Total thumb-trimmed	357,160	$89,060
Split	21,400	6,400
Total	378,560	$95,460

White Mica and Rare Earths—There are several mines of white mica (muscovite) which have not been worked of late years. Attention has, however, been called to those mines in consequence of its having been found that they contained rare earths such as uranium, thorium, yttrium, cerium, etc.; also radium has been found in them. Last summer a company whose head-office is in Paris, the Canadian General Mining Company, Ltd., bought the Maisonneuve mine in the county of Berthier, in which samarskite was found, and that of Pieds des Monts, county of Charlevoix, containing cleveite and radium. It proposes to develop those mines and utilize those rare minerals which have hitherto been looked upon merely as mineralogical curiosities, but which in some parts of the veins seem more abundant than was supposed. Last season, the Maisonneuve mine was worked with a dozen men, and several tons were sent to Paris to be assayed. The company proposes to carry on operations on a large scale if the results are satisfactory. In the environs of Lake St. John also, a mine of white mica has been opened in which are ores of cerium.

Gold—A very small quantity of gold is obtained from some of the stream beds in the Beauce district, by transient workers. There was no change last year.

Notes from the Cobalt District.

SPECIAL CORRESPONDENCE.

The Cobalt mining area is to have additional railroad facilities. Owing to the large volume of traffic caused by the opening up of the mines and the influx of prospectors the Timiskaming & Northern Ontario railway, owned by the Provincial Government, has been enabled to make a very good showing, the net profit for the month of April amounting to $23,617. The commissioners by whom the road is operated fully realize the importance of doing everything possible to develop the mining industry as the chief source of traffic, and will run a spur line to the Giroux and Kerr Lake districts. Two routes are under consideration, one from the south of Cobalt Lake and the other from a point near Argentite, north of Cobalt. The construction of the spur will give about 10 producing mines direct railway connection, including the Foster, University, Jacobs, Nova Scotia and Silver Leaf, and improve the transportation facilities of several others.

Discoveries of new veins on the properties under development in the Cobalt area are of every day occurrence. At the Nova Scotia property a vein has been found 12 in. wide carrying 50 per cent. silver at a depth of 70 ft. The other veins are improving in value as they are followed downward. Three important veins have been discovered on the Columbus-Cobalt property, in addition to the wide cobaltite vein now being worked, which carries a good percentage of silver. A shaft is being sunk to the depth of 100 ft., and extensive drifting will be done. Development work is going forward by double shifts.

Much attention has been directed by recent discoveries to the Wendigo Lake district, where numerous properties have for some time been at work. Wendigo Lake lies some 34 miles north of Cobalt. Three prospectors have made a find of ore assaying 23 per cent. on the surface. Another discovery in the region north of Cobalt is reported near the White River some eight miles below Tomstown, and consists of an 8-in. cobalt vein with good nickel and silver contents. In the Temangami forest reserve a good discovery of molybdenite has been made.

There is much discontent among miners and prospectors over the working of the new mines act, especially as relates to the system of inspection. It is claimed that the inspector is given too much arbitrary power, and that in the absence of any specified standard of value, such as assays, claims are rejected unreasonably while the owners are prepared to go ahead and spend money on their development. It is asserted that some of the claims which have failed to meet the inspector's approval have afterward turned out well. Furthermore, there is a strong feeling against allowing several applicants to prospect the same location, which often leads to one man obtaining the benefit of another's work. Petitions are being extensively circulated for signature for the correction of these abuses, and mass meetings are announced for the appointment of delegates to interview the Government.

The suit recently brought by the Provincial Government against Edward C. Hargrave and the White Silver Mining Company to set aside leases covering 120 acres of Cobalt mineral lands, on the ground that they were obtained by fraudulent affidavits of discovery, has been decided by Judge Boyd in favor of the Government, and the leases will accordingly be annulled, unless the decision is reversed on appeal. The trial was followed with much interest. It lasted for 10 days and a large number of witnesses were heard, whose testimony was of an exceedingly conflicting character. Judge Boyd's decision was mainly based on the inconsistencies of the evidence given by George Haines, the prospector. He stated that he discovered cobalt bloom, while the claim was based on the discovery of cobalt arsenide. While deciding against the validity of the leases, the judge held that the Government must compensate the defendants for any expenses actually incurred. This decision, unless reversed, will be far-reaching in its effects, as there are many properties now in the market or being operated the title to which would not bear too close scrutiny. Doubtless, an appeal will be taken.

Questions and Answers.

Fuller's Earth.

What is the value of fuller's earth, the market for it, and the commercial requirements, i. e. the chemical composition?

I. V. M.

Answer—The fuller's earth produced in the United States averages in value between $5 and $10 per ton at the point of production. The principal consumers are the Standard Oil Company, and the Cheseborough Manufacturing Company, both having offices in New York. The commercial value of Fuller's earth can only be determined by a practical test of the material, to prove its adaptability to the purpose for which required.

The Potter Process.

Can you give me any further information in regard to the "Potter Process," patented by C. V. Potter of Melburne, Australia, referred to in the JOURNAL of May 26, 1906? Is there any one using it in the United States or Canada, or exploiting it?

J. B.

Answer.—The Potter Process is one of the class known as "Flotation Processes," the theory of which was discussed in articles published in the JOURNAL of Feb. 10, and Feb. 17, 1906. Practically the only other literature is comprised in articles published in previous volumes of the JOURNAL and in the book by Donald Clark on "Australian Mining and Metallurgy." The articles cited above, however, are the best reference. So far the process has not come into use anywhere except at Broken Hill, New South Wales; so far as we are aware there is no one exploiting it in the United States or Canada.

Coal and Ore Pockets.

In the JOURNAL (May 5, 1906, p. 84) an article by J. H. Granbery under the title "Coal and Ore Pockets" refers to the graphical method of Malverd A. Howe. Can you tell me in what form this method has been published? It seems to be a solution of many difficulties and I should like to obtain the publication.

C. C. B.

The graphical method suggested by Mr. Howe was published in *Engineering News* (Nov. 4, 1897, p. 294) in the discussion following the collapse of the coal pocket at the power-house of the Edison Illuminating Company at Paterson, N. J., in that year. This number is now out of print, and the discussion by Mr. Howe is therefore published (by permission) in full.

Under certain assumptions the determination of the pressure upon the sides of a coal or grain bin is comparatively a simple matter. Given the weight of the coal or grain per unit of volume and its angle of repose, the pressure within the mass or upon the sides retaining the same can be taken to follow the laws usually assumed for a granular mass without cohesion.

The above data and the assumption accepted, the process of obtaining the pressures is as follows:

(A) Surface of coal or grain level.

Let A B C D represent one side and the bottom of the bin and assume the coal or grain level with the top of the side A B.

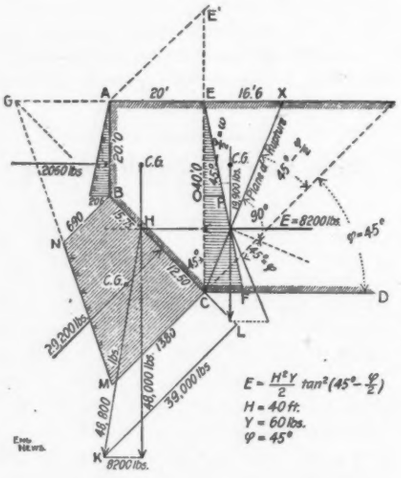
First determine the pressure upon the vertical plane E C due to the mass upon the right; this is given by the formula

$$E = \frac{H^2 Y}{2} \tan^2 \left(45° - \frac{\psi}{2}\right)^*$$

where

E = required thrust or pressure,
H = vertical height of plane $C E$,
Y = weight of a unit volume of coal or grain,
ψ = angle of repose of coal or grain.

The force E acts parallel to the surface of the coal or grain and hence, normal to E C.



Since in a granular mass without cohesion the intensity of the pressure upon any plane varies directly with the depth below the surface, the total pressure E may be represented by the triangle E C F, the intensity of the pressure or E being represented by C F. The application of the resultant thrust E is evidently at a point above C a distance equal to 1/3 E C. Having determined the thrust E and its location we need not consider the coal or grain on the right of C E further, but replace its effect by the thrust E.

To determine the thrust upon the side B C we first consider the plane G C, or B C produced until it cuts the surface line of the coal or grain produced. The pressure upon the plane G C equals the resultant of the force E found above and the weight of the triangle of coal or grain G E C. The weight of this mass is easily computed. Letting this weight act through the center of gravity of the triangle G E C, by parallelogram of forces we obtain the resultant H K in magnitude and direction.

The normal and tangential components of H K are K L and H L. Now since the intensity of pressure varies directly as the depth, the normal component can be represented by the triangle G M C having an area equal to the magnitude of K L. The total normal pressure upon the plane B C is then equal to the area of the trapezoid N B C M and is applied at a point between B and C found by drawing a line through the center of gravity of the trapezoid N B C M parallel to M C. The pressure upon the vertical side A B is evidently equal to the area of the triangle E O P and is applied at a distance above B equal to 1/3 A B.

With the exception of the computation of E (and E can be found graphically) the above process is practically graphical and also very simple.

(B) Surface of coal or grain heaped—slope being at angle or repose.

In this case it is practically impossible to obtain the actual thrust against the vertical C E E' unless the surface A E is assumed to be continuous—then the thrust is given by the formula

$$E = \frac{H^2 Y}{2} \cos \psi$$

H in this case being E'C. The direction of E will be parallel to the surface A E and its point of application at a point distant above C equal to 1/3 E'C. The remainder of the process is the same as outlined for level surface.

S. A. Jamieson, elevator engineer, of Montreal, Can., in a paper on "Grain Pressures in Deep Bins," read before the Canadian Society of Civil Engineers, December, 1903, reports experiments which, while referring especially to the behavior of cereal grains, also showed that dry sand acts in a similar way; it is not improbable that the same general rules apply to heavier mineral particles under the same conditions of dryness, etc.

Mr. Jamieson's paper is too long and intricate to be summarized satisfactorily in a brief note. The nature of his conclusions, however, is indicated in the statement that, in a deep bin, only a small proportion of the weight of the material is carried on the bottom, the major portion—depending upon the depth of the bin—being exerted against the sides, where it is resolved into vertical pressure by friction. The proportion of the total weight of grain in a bin that is carried by the walls and on the bottom, and therefore the intensity of both the vertical and lateral pressures, he finds dependent upon the following factors: (1) Coefficient of friction between the granular material and the bin walls; (2) ratio of the breadth or diameter of the bin to the depth; (3) ratio of the horizontal area or weight of the column to the area of the bin walls; (4) angle of repose of the granular material, or the ratio of lateral to vertical pressure.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNA informed of their movements and appointments.

Wm. A, Farish was in Denver last week and left there for New York.

Jesse Scobey left Denver for Arizona a few days ago to be absent about six months.

G. A. Duncan, of Denver, is at present examining properties in Lincoln county, Nevada.

Enos Ayres, son of the late H. R. Ayres, has joined the force of the Traylor Engineering Company in New York.

Nick Treweek, one of the prominent mining operators of Utah, spent several days in Butte recently on mining business.

Charles Wilkinson, of Whitehaven, England, arrived in New York June 29, on his way to Colorado, on professional business.

Ernest Howe, of the United States Geological Survey, has been appointed geological engineer for the Panama Canal Commission.

Walter Harvey Weed has gone to Butte, Mont., on professional business. Before returning to New York, he will visit other points in the Northwest.

Carl Scholz, of Chicago, president of the Rock Island Coal Company, spent June 19 and 20 at McAlester, I. T., on business in connection with the Indian Territory mines of that company.

S. Herbert Williams has been elected managing director of the Shawmut Consolidated Copper Company, and left Boston July 5, for the inspection of the Shawmut and other properties.

Robert Musgrave, late with the Copper Queen Consolidated Company, at Bisbee, Arizona, has been appointed general superintendent of El Tigre Mining Company, at Yzabel, Sonora, Mexico.

Hermann A. Keller, mining engineer, of New York, has removed his office from No. 30 Pine street, to No. 45 Broadway. Mr. Keller is at present in Alaska on professional business, where he will remain until September.

F. F. Sharpless, of New York, has been examining the Homestake property at Adams Lake, north of Kamloops, B. C., and has left there for Rossland, B. C., where he will go to Spokane, Wash. He expects to return to New York about the middle of July.

Thomas B. Burnite, who until recently was connected with the engineering department of Chas. C. Moore & Co., Engineers, San Francisco, has severed his connection with this company, and is now with the John A. Traylor Machinery Company, in Denver, Colorado.

Joseph A. Coram, organizer of the American Consolidated Copper Company, arrived in Butte June 26, to arrange for the beginning of work on the property belonging to the Davis-Daly Estate Company, a unit of American Copper. He was met there by Duncan MacVichie, superintendent of the Bingham property in Utah, who will direct the operations of the Davis-Daly Company.

Archibald Carmichael, lately of Broken Hill, New South Wales, one of the inventors of the Carmichael-Bradford process for desulphurizing galena, has been a recent visitor in New York, having arrived from Europe, where he has been engaged in matters connected with the allowance of the German patent on his process. The German Patent Office finally decided in his favor, and the patent will be issued. Before returning to England, Mr. Carmichael will visit some of the important smelting centers of the United States.

Obituary.

William A. Akers, a mining engineer of Los Angeles, Cal., was killed June 16 in an automobile collision in that city. Mr. Akers was about 40 years old, and formerly lived in El Paso, Texas.

Otto G. Mayer, who has been in charge of the pyrites business of Ladenburg, Thalman & Co., of New York, died June 25 at his home at West Orange, N. J. He succumbed to heart disease after an illness of two weeks. He was 54 years of age. Before becoming connected with Ladenburg, Thalman & Co., Mr. Mayer was a member of the firm of Otto G. Mayer & Co., which operated the Stella pyrites mine in northern New York.

Henry P. Weidig was killed June 27, by falling from a window of a hotel in St. John, N. B., where he had stopped while on a vacation trip. He was born in Germany about 53 years ago, and graduated from the University of Heidelberg. He came to the United States about 1880, and engaged in chemical work, acquiring a high reputation for technical knowledge and skill. For a number of years he had been a member of the firm of Charles Cooper & Co., of Newark, N. J., having special charge of the chemical manufacturing department.

Societies and Technical Schools.

University of Kansas—On account of the resignation of Professor L. C. Hodson, who has accepted a position in the Iowa State College, the position of associate professor of mining at the University of Kansas, at Lawrence, is vacant.

State College of Washington—The Mining Department of the Washington State College, at Pullman, has five graduates this year. The past year has been a very successful one. A number of improvements and additions have been made during the year calculated to broaden and facilitate the laboratory work, especially in metallurgy and ore dressing. The summer school of mines, which began immediately after commencement, is held in the Cœur d' Alene. This course covers three to four weeks' work, and will include mine surveying, methods of mining, mill practice, etc. The class will be in charge of Prof. R. P. Jarvis.

Industrial.

The Dominion Iron and Steel Company has taken a contract for 50,000 tons of 60-lb. steel rails for the Canadian Northern railway system.

The Duff Manufacturing Company, Allegheny, Pa., has opened a New York office in the Havemeyer Building, Cortland street, in charge of George E. Edgin.

A. J. Vance, who has recently taken up the interests of the Buffalo Forge Company and the Buffalo Steam Pump Company in Cincinnati, is located at 403 Neave Building in that city.

The Pacific Coast office of the Wellman-Seaver-Morgan Company has been moved from its temporary location in Oakland, and is now permanently established in the Atlas Building, on Mission street, San Francisco.

The Canadian Government has awarded contracts for 65,000 tons of steel rails for the National Transcontinental Railway. The Dominion Iron and Steel Company secured orders for 23,000 tons for delivery at Quebec at $34 per ton, and 10,000 tons for delivery at Port Arthur at $34.50 per ton. The Algoma Steel Company, of Sault Ste. Marie, got a contract for 32,000 tons for delivery at Port Arthur, at $34 per ton.

The Indiana Steel Company, which is building the new steel works at Gary, Ind., for the United States Steel Corporation, has let a contract to the Westinghouse Machine Company for gas-driven blowing engines for its blast furnaces. This order calls for eight twin tandem, double-acting, horizontal gas engines of 3000 h.p. each, or a total capacity of 24,000 h.p. The approximate value of this order is about $1,000,000. The engines are Westinghouse gas engines and they will deliver 30,000 cu.ft. of free air per minute.

The Illinois Steel Company, Chicago, has ordered an aggregate of 8000 kw. in Allis-Chalmers gas-engine generating units, intended for installation in the central power plant at the South Works, South Chicago, to operate by blast furnace gas. The original order for two engine-generator units was placed some time ago, calling for prime movers of the horizontal, twin-tandem type, 3000 b.h.p., for direct connection to generators of 2000-kw. capacity each, 25 cycles, 6600 volts, three-phase. The two additional engines and generators recently ordered are to be duplicates of the former units. Other units of similar design now being built by the Allis-Chalmers Company are

one 2000-kw. unit for Carnegie Steel Company, Homestead plant; one 1500-h.p. engine for the National Tube Company, McKeesport, Pa.; and four 3000-b.h.p. gas blowing engine units for the Carnegie Steel Company, Homestead plant. The alternators for these units are being built at the electrical works of the Allis-Chalmers Company, Cincinnati, Ohio, and the engines at the West Allis, Milwaukee, shops.

Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars;

Fulton Foundry and Machine Works, Atlanta, Georgia. Pp. 29, illustrated; paper, 7x10 in.

American Manufacturing Company, 65 Wall St., New York City. Catalog, Rope. Pp. 12, illustrated; paper 4x6 in.

Crane Company, Chicago, Illinois. Vol. II, No. 5. The Valve World; Pp. 16, illustrated; indexed; paper, 10x15 in. May, 1906.

H. W. Johns-Manville Company, Portland, Maine. Portland Sectional Conduit; Pp. 32, illustrated; paper, 4½x7 in. June 1, 1905.

Toledo Pipe Threading Machine Company, Toledo, Ohio, U. S. A. Toledo Pipe Threading Devices; Pp. 20, illustrated; paper, 5x7 in.

Stephens-Adamson Manufacturing Company, Aurora, Ill. Catalog No. 1. Conveying & Transmission; Pp. 16, illustrated; paper, 6x9 in. June, 1906.

Niles-Bement-Pond Company, 111 Broadway, New York. U. S. A. No. 13. Progress Reporter; Pp. 12, illustrated; paper, 6x12 in. June, 1906.

Simplex Valve & Meter Company, 112 North Broad Street, Philadelphia, Penn. Simplex Valves and Meters; Pp. 23, illustrated; paper, 6x9 in. 1906.

Wellman-Seaver-Morgan Company, Cleveland, Ohio, U. S. A. Section "C" Open Hearth and Re-Heating Furnaces; Pp. 48, illustrated; paper, 9x12 in.

Crocker-Wheeler Company, Ampere, N. J., U. S. A. Bulletin No. 64. Form 1 Motors and Generators; Pp. 15, illustrated; paper, 7x10 in. April, 1906.

Harrington & King Perforating Co., 114 Liberty street, New York City. Booklet No. 1. Perforated Brass and Tin; Pp. 9, illustrated; paper, 4x7 in.

Mine & Smelter Supply Company, Denver, Colorado. Bulletin No. 6. The No. 5 Wilfley Concentrator; Pp. 17, illustrated; paper, 7x10 in. September, 1904.

Chicago Pneumatic Tool Company, Chicago. Special circular No. 56, descriptive of special electrical tools and accessories; Pp. 4, illustrated; paper 9x12 in., 1906.

Stanley Electric Manufacturing Company, Pittsfield, Massachusetts. Bulletin No. 62. G. I. Flush Push Button Switch; Pp. 4, illustrated; paper, 6x9 in. May, 1906.

Westinghouse Electric & Manufacturing Company, Pittsburg, Pa. Circular 1132. Westinghouse Protective Apparatus; Pp. 23, illustrated; paper. 7x10 in. May, 1906.

Allis-Chalmers Company, Milwaukee. Wis., U. S. A. Bulletin 1504. Allis-Chalmers Steam Turbines and Generators; Pp. 31, illustrated; paper, 8x11 in. May, 1906.

Star Corundum Wheel Company, Ltd., Detroit, Mich. Catalog No. 8, Emery and Corundum Wheels, Grinding Machinery and sharpening devices. Pp. 101, illustrated; indexed; paper, 7x9 in.

Norwalk Iron Works Company, South Norwalk, Conn. Leaflet, Duplex Air Compressors. Pp. 4, illustrated; paper, 4x6 in. Catalog, The Norwalk Air and Gas Compressors. Pp. 112, illustrated; indexed; paper, 7x10 in.

Electric Storage Battery Company, Allegheny Avenue and 19th street, Philadelphia, Pa. Bulletin No. 98. The "Chloride Accumulator" in Central Station Lighting and Power Plants; Pp. 9, illustrated, 8x11 in. June, 1906.

Mine and Smelter Supply Company, Denver, Colo. Bulletin No. 14. Stamp Mills and Cyanide Processes; Pp. 56, illustrated; indexed; paper, 7x10 in. Bulletin No. 12. Smelting Machinery; Pp. 43, illustrated; paper, 7x10 in. August, 1905. Bulletin No. 8. No. 2 Wilfley Slime Table; Pp. 19, illustrated; paper, 7x10 in. May, 1905.

Construction News.

Deadwood, South Dakota—It is proposed to erect a mill at the Big Four mine.

Baker City, Oregon—It is proposed to put in a new plant at the Elkhorn mine, to treat copper ores. Edward I. Field, Baker city, is manager.

Platteville, Wisconsin—It is proposed to put in a new concentrating plant at the Sally Waters mine; also a steam hoist. Kiel & Anderson, of Chicago and Platteville, are owners.

Columbus, Ohio—The Columbus & Hocking Coal and Iron Company informs us that the plans for the brick plant which it is about to erect, are ready. All contracts will be let on a strictly competitive basis. No commissions whatever will be allowed, and all bidders will have an even chance of securing contracts. The plant will introduce many new features. Producer gas will be used, and the contracts for gas engines and electrical work especially will be large. Blue-prints and specifications can be obtained by prospective bidders by applying to R. A. Magly, general manager, Columbus & Hocking Clay Construction Company, New First National Bank building, Columbus, Ohio.

Special Correspondence.

San Francisco. June 28.

Over $500,000 worth of contracts for grading and construction at the new Guggenheim smelter at San Bruno Point, south of San Francisco on the bay shore, have been let. It is expected that within two months, more than 1000 men will be employed on the site constructing buildings, wharves and docks. Over 150 acres have been secured and will be occupied by the smelter. There are now on the ground 2000 tons of heavy steel rails to be used in the construction of a 10-mile series of tracks. Large contracts have been entered into with big mining corporations in Alaska, Asia and other countries, and big freighters will be employed in bringing ore to this port. The machinery for the smelter has been designed and ordered.

At the last meeting of the Anti-Debris Association's executive committee held in Sacramento a report was received that the work of landlocking the dredges in the vicinity of Oroville is going on, but is not completed. Various suggestions were made in regard to prosecution of the work of the association, and it was decided to leave all matters for future action in the hands of a committee, consisting of David Morrison, of Wheatland, M. Graves, of Sutter, and Howard Johnson, of Sacramento, with power to act. This looks as if the Anti-Debris Association was in not much better shape than other associations of the State since the earthquake. There is nothing to show that a lot of employees will be kept at work watching the gravel miners as in times past. Probably the finances are not in good condition. The miners will feel a great relief when this Association finally goes out of existence.

The Standard Electric Company is running a power line from Calaveras county to the Groveland mining district in Tuolumne county and has poles up as far as Mocassin creek. This will enable the mines in that section to utilize electricity. The Mack and Longfellow mines will be worked by electricity. At the Mack the motors are installed. Power will be turned on within a month.

In Nevada county a survey is being made from Fuller Lake to Graniteville, a distance of 15 miles, for the extension of the Birce & Smart steam railroad from the lake to Gaston and Graniteville, important mining camps of the country. Birce & Smart, large lumber and sawmill men, with yards at Emigrant Gap, built the present narrow-gage road from that place to Fuller Lake, a distance of six miles, at a cost of $35,000. It taps one of the finest lumber regions in California. The company has long been figuring on the extension which it will now build, having had many good offers of freighting patronage from the big mines and the towns in that part of the country. With

the construction of the road practically all the freighting to up-country points will be a thing of the past, as far as teaming out of Nevada City, the central distributing point for many years, is concerned. The road will bring supplies so much nearer the large mines that a great saving in time and expense will be made. There are numbers of mines, idle for many years owing to distance from railroads, which will now be able to work advantageously. There are large bodies of rebellious ores which can only be handled by being shipped to the smelters, and there are no smelters in that region.

A mining engineer who has been examining into the possibilities of the south fork of Smith river, in Del Norte county, found good values, but the roads were so poor that the people he took in refused to entertain any kind of a proposition to begin mining in a section where everything has to be packed in. The county has built no roads into the region, but will now probably do so.

There is a lesson in this to other counties which have neglected their mining sections. If they expect capital to make investments, the ordinary conveniences for travel must be supplied by the proper authorities. Trails will no longer suffice, as there are plenty of places to mine in this State when means of transportation are at command.

The Mammoth Copper Company is about to add one, if not two, additional furnaces to the new smelter at Keswick, Shasta county, increasing the capacity one-half.

James H. Leggett, the dredging man has been arrested at Oroville, upon complaint of the City superintendent of streets acting under instructions of the Board of Trustees, upon a technical charge of obstructing the highway. The essence of the charge is that Leggett, who is operating a dredge within the corporate limits of the city, has encroached upon the streets of the city. There has been for a year or so more or less controversy between the trustees of Oroville and the gold-dredging men on this subject of dredging within the city limits and this arrest and resultant trial will doubtless bring the matter to a head.

An important strike has been made in Nevada City district, at the Blue Tent gravel mine. The upraise that was being driven from the main tunnel at a point 755 ft. in from the mouth has encountered the channel on the east rim-rock at a point 65 ft. above the tunnel. The dirt is rich and well distributed. The discovery is a new find and it practically amounts to the development of a new mine.

On Tuesday of this week a box car on the Sierra railroad between Jamestown and Angels, jumped the track on a curve near the Great cañon of the Stanislaus river, six miles from Angels. The overturning of the car exploded 1½ tons of dynamite killing one man and injuring others, and hurling parts of the wreck half a mile or more. On two of the five cars of the train were two traction engines consigned to the Union Construction Company. One of these engines was blown into pieces and cannot be located. A piece of the engine and a stringer, 8x10 and 14 ft. long, were thrown half a mile and struck the ground at the Jones mine. This wrecked the chlorination works at the mine.

In Grass Valley a suit has been commenced by Stephen Maynard against the Maryland Quartz Mining Company to quiet title to a certain piece of land known as the East Eureka quartz mine. It adjoins the once famous Idaho, of which the Maryland is a continuation. Maynard asserts that the mining companies lay claim to this ground, of which he has been in continual possession for the past five years and more without dispute, during which time he paid all the State and county taxes levied. The Maryland is being re-opened by a Boston company which has already spent close to $100,000 in the work.

Goldfield, Nev. June 28.

The area of the gold mining section of Nevada is being constantly enlarged by new discoveries, and more in the way of news comes from the outside camps than from Goldfield itself.

The Mohawk Mining Company, at Goldfield, is putting in place an electric hoist at No. 1 shaft, and is shipping about 120 tons a day.

A record for this district has been made by Superintendent J. R. Munden on the Norcross Mining Company ground at Goldfield. In 20 days Mr. Munden, with four men, using a windlass, sank 50 ft. and fully timbered his shaft at a cost to the company of $7.50 per foot. At present the shaft is down 110 ft., and with gallows frame and hoist house all erected. The superintendent is awaiting the arrival of the 25-h.p. gasolene hoist, which has been shipped from Denver. The company intends to sink 200 or 300 ft. before cross-cutting. Considerable difficulty will be experienced with water from this time on, it is feared.

At Bullfrog there is the usual activity, and several mines are shipping ore steadily. Several sales have been made. Among other transactions, J. Webster, of San Francisco, has taken over the Bromide group of Sexton & McDonald. The consideration is $15,000 in cash and a minority stock interest. The Bromide property joins the Wildcat, now owned by the Banner Company.

The Johnnie district, in Nye county, is the scene of much activity. The town will be less than 10 miles from the Las Vegas-Tonopah railroad. A number of claims have been worked and are showing well. The Johnnie Consolidated Mining Company is working several claims, and has a 10-stamp mill.

At Silver Peak the Pittsburg-Silver Peak Gold Mining Company is preparing to work on a large scale. The company owns the Blair property, on which development is being pushed. It is building a railroad 17 miles long, from Silver Peak to a connection with the Tonopah railroad at McLain's Wells. The company has lately absorbed the property of the Mohawk-Alpine Company.

The first shipment of gold ore from the new camp of Millett, situated about 40 miles north of Manhattan, was made last week. The ore came from the property of the Manuel Mining Company, and is of high grade. It was hauled by team to Austin, and from there was shipped to Salt Lake City. Other shipments will follow. The Manuel Mining Company owns a group of 26 claims. The town of Millett is improving rapidly, telegraph and telephone having already been installed and a postoffice established.

From Lodi, in the northwestern part of Nye county, 22 miles from Fairview and 65 miles southwest of Austin, a sensational gold strike is reported. Morris & Stratford, the pioneers of the district, and owners of the Jumbo mine, report that on the 40-foot level of their shaft they took out samples rich in gold. Twenty-two mines are being worked in the district. The old Illinois mine, situated in the same range three or four miles distant from these properties, has been working off and on for years, and has now at the 500-foot level some 7 feet of ore. The Illinois mine is owned by Wolfe and associates of Colorado. Lodi is attracting a great amount of attention, and many prospectors are headed for that section.

Salt Lake City. June 28.

Utah's mines have done well during the month of June in the way of dividends. Payments were ordered by 16 companies, and there are some close corporations besides, from which reports are infrequently given out to the public—aggregating the sum of $1,109,000. This is the best record for a single month in the history of Utah mining. Two Bingham mines are among the payers; two represent Park City; eight the Tintic district; two, the gold camp of Mercur; one, Beaver county and one, the Fish Springs district in Juab county. The distributors and their respective amounts are: Utah Consolidated, $750,000; Daly West, $108,000; Silver King, $50,000; Gemini, $50,000; Consolidated, $25,000; Beck Tunnel Consolidated, $25,000; Grand Central, $15,000; Horn Silver, $20,000; Mammoth, $20,000; Victoria, $12,500; Yankee Consolidated, $12,500; Swansea, $5000; Sacramento, $5000; Uncle Sam Consolidated, $5000; Utah (Fish Springs), $4000; West Mountain Placer, $2000.

The management of the Daly Judge mine at Park City has discharged its in-

debtedness, which aggregated $231,000 at the beginning of the present year.

The board of directors of the Swansea Mining Company, Tintic mining district, has issued a statement to shareholders covering operations from June 1, 1902, to May 31, 1906. It shows that on June 1, 1903, the company had liabilities amounting to $4099. From that date, and until May 31, 1905, additional expenditures were made making a total of $24,707, and left a surplus of $628 on hand above all liabilities. On account of the low price of metals during the three years and unfavorable market conditions the mine was practically closed down. At the beginning of the last fiscal year, however, the company was able to get a favorable contract with the smelters and production was resumed. During the last 12 months ore marketed netted above all expenses $1.89 per ton. The ore shipped amounted to 9352 tons, which was sold for $44,448; the costs of mining were $26,729, netting $11,719, while there was received as royalties on lease ore $6118, bringing the total net receipts up to $17,836. Dividends on the issued stock were paid, amounting to 10c. a share, or $9714, leaving a surplus account of $8419. The cost of mining was figured at $2.48 per ton. From the ore sold, 126,894 oz. silver, 226 oz. gold and 21 tons of lead were obtained.

Special meetings of the Petro, Red Wing, Highland Boy Consolidated, and York Mining companies of Bingham have been called for July 20, the purpose of which is to take steps towards disincorporation. These companies are controlled by the Utah Apex and Utah Development companies.

Articles of incorporation of the Continental Transportation Company have been filed, with Henry M. Crowther, of Salt Lake, general manager. The company will build and operate a line of railroad betwen Bingham Junction and Alta. Construction work will probably begin within a few weeks. President Crowther promises a tariff on ore to the Salt Lake smelters as low as that operative from Park City.

The management of the Boston Consolidated Mining Company, has let contracts for 286 Wilfley and 254 Johnston concentrating tables for its new Garfield mill. The Wilfley contract calls for the payment of over $100,000.

Leadville. June 29.

The recent strike in the Mammoth, Big Evans gulch, is bringing that section of the camp quickly to the front, and demand for property in the neighborhood is on the increase. One to see the great possibilities of the district is Thomas F. Walsh, of Camp Bird fame, who, with Timothy Goodwin, late manager of the New Monarch Mining Company, recently purchased the Roy group of claims to the north of the Mammoth, embracing about 60 acres of ground. Within a few weeks work will be started and a shaft sunk from the surface to mineral; the shaft will be equipped with the latest machinery and a heavy pumping plant. There are several other deals on for property further up the gulch, but not advanced sufficiently to give details.

The French Mountain Mining Company, operating at Holy Cross, during the week opened a 4-ft. vein of ore in the upper tunnel on the Grand Trunk claim, that runs high in gold per ton. The ore was found in an upraise from the breast, 600 ft., and in the middle of the vein is a rich streak 1 ft. wide. In another tunnel further down the hill a body of ore was opened at the breast that will run well, with the vein 7 ft. wide. At the main cross-cut tunnel at the foot of the mountain, which is in a little over 2600 ft., another 60 ft. has to be driven before the vein is cut.

The Moyer shafts of the Iron Silver Mining company are producing 10,000 tons of ore monthly, and an unusual amount of development work is being done in addition. At the Tuscon a number of drifts are being run in different directions from the bottom of the shaft to the orebody, and the east drift has cut into the copper-zinc sulphides. A railroad spur will be carried to the ore bins to facilitate the handling of the ore. Considerable water is being cut, which makes it next to impossible to sort the ore; this will be obviated as the ground is opened. The lessees on the other properties belonging to this company on Iron hill are shipping steadily an excellent grade of iron and some carbonates.

Manager McDonald, of the New Monarch Mining Company, is gradually getting affairs in shape, and it is his intention to resume work on every shaft belonging to the company as quickly as possible, and so develop the holdings of the company. The first shaft to be started is the Katie, which is now being put in shape for the handling of a heavy tonnage.

All of the surface improvements at the Badger shaft, belonging to the Triangle Mining Company, Adelaide Park, should be completed this week, when a careful examination of the shaft will be made; the shaft will probably be found in good condition, as it was sunk in a porphyry dike, which generally stands well. If the shaft is found to be in good working condition drifting will at once be started from the bottom in different directions to catch the ore channels that trend through this section from Iron hill.

The work of drifting to the orebody in the Mammoth from the bottom of the shaft has commenced. Drifting is being pushed into new territory on the Pawnolas.

As the snows at or about timber-line melt and the roads become more passable, different properties are resuming work for the season. Among these is the Continental Chief at the head of Iowa gulch. This property will work a large force of men during the season; the principal work will be carried on from the lower tunnel.

The Boston-Arizona mill is now running steadily with three shifts on custom ore making a 45 per cent, zinc product.

The Silver Nugget on Breece hill resumed work during the week, and is now busily engaged in unwatering the shaft.

A carload of ore was shipped during the week from the Catalpa claim in the Winfield district that netted 0.33 oz. gold, 50 oz. silver and 60 per cent. lead. The ore was taken from a fissure in the granite.

Denver. June 29.

There seems to be a probability of a gigantic merger being carried through, before long, of practically the largest properties in the Cripple Creek district, including the control of the great Portland mine. It is stated that the Venture Corporation is interested in the deal.

It is understood that the reports of the engineers of the Colorado & Southern system, who have been occupied on the preliminary work for a trunk line to New York, have been forwarded to the latter city and if the plans are carried out, the system will own a line from Galveston to Denver, thence to Cheyenne, through the Shoshone and Crow reservations and Montana into Washington and to Seattle.

M. J. A. Durfee, who superintended the construction of the first open-hearth furnaces in the West, has been appointed assistant manager of the Colorado Iron Company's plant at Pueblo.

As soon as suitable land has been secured, it is the intention to commence the construction of a powder factory for the manufacture of powder, dynamite and other explosives, near this city.

Every year, about this time, when prospectors strike out over the mountains in large numbers, it is usual for excitements to follow the discovery of more or less valuable specimens, and this summer is no exception. Although, as a rule, these finds are only short lived, they lead to an examination of the surrounding country, and thus the new producing districts have invariably been discovered. It looks as if near Ilse, about 18 miles southwest of Florence a promising mining district has been discovered within the past few weeks. A drawback to the development will be the fact that the property is settled by farmers holding deeds for their land, which prevents prospecting thereon.

Duluth, Minn. June 29.

Iron-ore shipments for the month from all Lake Superior districts will aggregate more than 5,500,000 tons, and are still increasing. They are likely to amount to 6,000,000 tons for July, unless there are unexpected conditions. These may be water; there has been a great deal of rain

this spring and the mines are already suffering, but are able to maintain their product. With much more water, however, there must be delay.

Drilling for iron is active now in the Ishpeming district and at Negaunee on the Marquette range; and there is good prospect of successful work. There are many drills on the Menominee range, and a few, though less than has been currently supposed, on the Vermillion. On the Mesabi there is always a great deal of work, and a number of new drilling contractors have begun business. In the Canadian region of Lake Superior, activity increases, and the work that has been mentioned as done by the Oliver Company, and Pickands, Mather & Company, is now added to by several other companies. On the newer so-called Cuyuna range work is carried on with a large number of drills scattered along for 50 miles. Most of the drillers are finding only the classes of ore that have been cut before, that is a lean non-bessemer, but in great quantity; but a few are said to be getting better. The Oliver Iron Mining Company has a number of leases, and is operating a few drills, but it is not having any better luck than its neighbors.

Scranton. July 2.

The surprise of the week in the anthracite region was the declaration of the Supreme Court of Pennsylvania that the mining act of 1877 was constitutional in its entirety. The opinion was handed down in connection with the celebrated Shaleen certificate case, and may finally end a wearisome but important litigation. The operators have stated, however, that they will carry an appeal to the Supreme Court of the United States. Under this decision no man can be employed as a miner in the anthracite region without first securing a certificate of competency, and as an essential to examination for such a certificate he must serve two years as a laborer in the anthracite mines. The mine workers are overjoyed at the result. The Shea certificate case is still before the higher courts, but it will be decided by the final result of the Shaleen case, the principle being practically the same in both cases.

Twenty-five thousand miners and boys employed in the mines of the Philadelphia & Reading Coal and Iron Company will be idle from June 30 to July 9, the company having decided to keep the mines closed during that time, owing to the dullness of the coal market. There will also be a general suspension of work in the mines of the Lehigh & Wilkesbarre Coal Company.

Immediate preparations are to be made by the Philadelphia & Reading Company to pump the water out of the lake at the lower end of Gilberton. This has to be done to save the Draper mines from being damaged, as the water is now finding its way into three of the gangways, and will soon place the mine out of operation if it is not taken from the dam on the surface.

The Pennsylvania Retail Coal Dealers' Association held its annual meeting in Easton, when the following officers were elected: President, S. B. Crowell, of Wallingford; vice-president, E. C. Smoyer, of Allentown; treasurer, C. Williamson, of Media.

Two miners were imprisoned in the Hacklebarnie mine, Mauch Chunk, for 22 hours on Friday. They were at work in a tunnel when a cave occurred, blocking them in the farther end. As soon as their danger was discovered gangs of men were organized who worked for 22 hours to release the two men. This was accomplished under the direction of Mine Inspector Morgans.

The National colliery of the Delaware, Lackawanna & Western Company has been closed for three months, in order that the machinery in the breaker can be removed and new machinery installed. The colliery was bought from the Connell Coal Company last year, and it was then decided that the breaker would be overhauled at the first opportunity. The improvements will double the capacity of the colliery.

A meeting of the Conciliation Board will be held in New York on July 6, when Umpire Neill will be present. The members spent last Monday night in the Plymouth mine of the Delaware & Hudson Company, investigating the trouble in connection with the compensation for lifting boney. This question will be considered at the New York meeting.

The Lehigh Valley Coal Company will drive a tunnel in the Twin Shaft mine, Pittston, to connect with the Red Ash vein, for a distance of 900 ft., to reach the coal which was lost 10 years ago by the great subsidence when 58 men were entombed and buried alive. The bodies of the men were never discovered.

The Lehigh Valley Coal Company is negotiating for the purchase of the Austin Coal Company.

Indianapolis. June 25.

Several important changes are announced to take place on the first of July in the Shirley Hill Coal Mining Company, one of the largest operators in the Linton field. This company controls the Victoria, Little Giant and Shirley Hill Nos. 1 and 2, which had the record for working the most days during the year.. The daily output is 3,200 tons. M. L. Gould, of Indianapolis, will become vice-president and general manager and J. Smith Talley, of Terre Haute, will retire. Some other official changes will be made and the general offices will be removed from Terre-Haute to Indianapolis. The Shirley Hill Company has purchased the Victoria mine which has been in operation several years. The consideration is said to have been $100,000.

The Diamond Mining Company, of Chicago, has leased the Hamilton mine and will equip it with modern machinery. John McAdams, manager of the Pennsylvania-Indiana Coal Company, will manage this mine.

There are 31 coal mines in active operation within three miles of Linton and two-thirds of this number have a daily output ranging from 20 to 35 cars a day, making a total of 750 cars aggregating 225,000 tons. It requires upward of 20 trains a day to move this coal. The Linton mines are all in operation, and never in the history of Indiana, have the mining conditions been better than at present. The operators say these conditions will continue the entire year as they have sufficient orders now booked to keep the mines running till September, at which time fall orders will begin to come in. There are upward of 3500 men in Linton. A local company has been organized to build an interurban line to be known as the "loop-in." The purpose is to use the line in running the cars to and from all the coal mines in this district.

Congressman Holliday of this district has induced the United States Geological Survey to make a survey of the coal fields of Clay, Parke and Vigo counties.

Toronto, Ont. June 28.

The Ontario Government is filling the positions created by the new mining act. C. H. Shera has been appointed mining recorder for the Port Arthur mining division, and F. R. Lemieux for the Sudbury division.

Mining Commissioner Price is preparing his report with regard to a large number of mining disputes as to the title to Cobalt claims, which is anticipated with a good deal of interest by the mining community.

The Temagami Forest Reserve has been constituted a mining division under the new law, to be known as the Temagami Forest Reserve mining division.

By a premature dynamite blast at La Rose mine, Captain John Harris, manager, lost the sight of one of his eyes and received other injuries, from the effects of which he is now in the Toronto General Hospital.

The discoveries recently made in the Cobalt area and neighborhood include another important find in Lot 1, Concession 3, of Coleman township, where a location has been taken up by Andrew Devine, who struck a rich silver-cobalt vein 7 in. in width. The claim has been acquired by the Beaver Silver Mining Company, of Montreal, the discoverer retaining a large interest. It lies to the south of Kerr and Cross lakes. Cobalt silver veins have also been discovered by W. H. Dickson's prospecting party at Gillies Station, some five miles to the souhtwest of Cobalt, near the Montreal river. Reported finds of metallic silver at Portage Bay up the Montreal river have been confirmed. Prospectors

are at work in the Temagami forest reserve. At Kokoko lake in the reserve Major Magee and W. R. Moore have discovered two 2-in. veins of cobalt and have also found nickel.

Recently a party of capitalists from Toronto, Montreal, New York and Boston visited the Nipissing mines as the guests of E. P. Earle, of New York, and others interested in the company. They were accompanied by Prof. W. Earle Hidden, and made a thorough inspection of the mine. The object of the trip was to permit members of the stock exchanges to realize for themselves the wealth of the Cobalt deposits, so as to be in a position to advise investors from personal knowledge. Many brokers have been disinclined to handle Cobalt stocks or to promote their sale in view of previous disastrous experiences. Much importance is attached to this trip in view of the extent to which shares in the large producing mines are being offered to investors. The party included W. Starr Bullock, and J. H. Cody, of New York; J. J. Pangman, secretary of the Montreal Stock Exchange; Edward B. Freeland, Victor Cawthra, Wallace Nesbitt, K. C.,Duncan Coulson, J. E. Osborne, E. S. Wills, and others of Toronto; and H. S. Sims, Henry E. Woodworth and W. F. Bartholemew, Boston.

The town site of Cobalt, the mining rights in which were reserved by the Provincial Government, is being sought after by mining men as it is known to be rich in silver. The power of disposing of the mining rights is vested in the Timiskaming & Northern Ontario Railway Commission. A large syndicate is in process of formation for the purchase on an extensive scale of town-site mining rights. The Town Site Mining Company has secured a 999-years' lease of the southwest 37 acres, for a cash bonus of $40,000, and an agreement to pay a royalty amounting to 25 per cent. on ores valued at $1000 per ton or less, and 50 per cent. on ores of greater value.

The Argentite Mining and Smelting Company, of which Capt. C. H. Palmer is president, and J. H. Devereux vice-president, has obtained a site for the erection of a smelter and has purchased the mining properties of Philip McKaig, on Lot 8, in the fifth concession of Coleman. Mr. McKaig will continue to direct mining operations for the company.

A new Technical School building will be erected in Toronto at a cost of $250,000, which has been voted for that purpose by the city council. An additional $30,000 will be required for equipment.

Sudbury, Ont. June 28.

The township of Balfour, in the district of Algoma and on the main line of the Canadian Pacific, west of Sudbury, is at present the scene of much active prospecting. J. B. Charlesbois and another prospector discovered a vein carrying gold, silver and cobalt and there has been a general rush for the field.

The Wright galena mine, on the shore of Lake Timiskaming, in the Province of Quebec, is at present under option to McMartin Brothers, of LaRose Company, $50,000 being the price of the property. For a number of years the ore was sacked and shipped to Swansea, Wales, for treatment, principally for the lead values.

The Ludwig Mond Nickel Company at Victoria mines is treating some of the Massey Station copper ore, and is lining their converters with it, instead of drawing quartz from the quartz mine, the latter containing no values whatever.

The Crane Hill property of the Copper Cliff Company, is said to carry high values in copper and the spur line from Victoria Mines station is nearing completion. Slag from the Mond Company's works is being used as ballast for the road bed.

Victoria, B. C. June 28.

Slocan—The gold commissioner for Slocan district, in his report for 1905, issued last week, says respecting ore production: "While the tonnage of silver-lead in 1905 slightly decreased in the Slocan district, the shipments of zinc more than made up the shortage. The production, as accurately as can be ascertained, was: Silver-lead, 13,270 tons; zinc, 11,395 tons."

The mining recorder for Slocan mining division reported that most of the mining properties in the division were fairly active during 1905 and that 12 properties were operated successfully under the leasing system, which is increasing in favor with miners and prospectors.

In Slocan City mining division the mining recorder reported more properties being worked, average value of ore shipped higher, and without exception results of work encouraging. The most gratifying feature was the proving of the existence of ores at greater depth and that these carry higher values than those near the surface.

Yale—It is officially reported that 15 miles of the main Fraser River channel, from Yale down, have been leased for gold-dredging purposes to a New Zealand syndicate, which intends building a dredge in the vicinity during the ensuing summer. As this syndicate has been profitably engaged in dredging in New Zealand for some time past, and as the machinery for the new dredge will be imported from that country, it will be interesting to note the results of New Zealand methods and machinery, as compared with past experiments in dredging on Fraser river. There are numerous dry bars and terraces along the river which should pay, if worked on a sufficiently large scale.

Similkameen—The following summary of mining operations in 1905 at the Yale Mining Company's mines, near Hedley, Similkameen district, has just been made public: On the Nickel Plate, 1500 ft. of tunneling and 50 ft. of raising; and on the Sunnyside, 500 ft. of drifting, 120 ft. of raising. About 2000 ft. of diamond drilling was done on the Nickel Plate, Sunnyside and Bulldog claims. Stoping was carried out at the Nickel Plate, and open-cut work at both the Nickel Plate and Sunnyside properties. Prospecting was done on numerous other claims held by the company. A new ore-storage pile and track were provided at the ore bins. The quantity of ore mined and milled during the year was: Nickel Plate, 17,437 tons; Sunnyside, 14,994 tons; total, 32,431 tons. The ore was loaded directly into two-ton cars and hauled by electric locomotives to the head of the gravity tramway, whence it is lowered in six-ton skips to the Daly Reduction Company's 40-stamp mill and cyanide plant at Hedley. The incline, or gravity tramway, is about 10,000 ft. long, drops nearly 4000 ft. between terminals, and requires four men to operate it. The ore yields about $13 per ton, chiefly in gold.

Vancouver Island—The first official information made public concerning the Tyee Copper Company's operations in 1905 is contained in the recently published report of the gold commissioner for Victoria mining division, as follows: During 1905 ore shipments from the Tyee mine at Mt. Sicker, Vancouver Island, amounted to 31,900 tons, containing 2,688,945 lb. copper, 87,028 oz. silver, and 5003 oz. gold, the total value of which, after deducting freight and refining charges, was $526,000. Heavy development work has been carried on throughout the year and the main shaft has been sunk to the 1000-ft. level. Exploratory work has also been carried on at the X. L. claim, on which the shaft has been sunk to a depth of 350 ft. and a cross-cut is being driven east at that level. At about 300 ft. from the shaft a strong selvage or gouge has been found, similar to that encountered to the south at the 1000-ft. level in the Tyee. It may be added that at the end of last January a cross-cut south at the 1000-ft. level of the Tyee intersected at 208 ft. from the shaft about 3 ft. of mineralized rock, carrying sulphate of barium (which is the prevailing gangue in the Tyee's big orebody between the 200 and 300-ft. levels) and values in copper, gold and silver. As the cross-cut passed through what is apparently the apex of a blind lode, this fact is regarded as auguring well for future developments of greater depth.

Texada Island—The gold commissioner for Nanaimo mining division, which includes Texada Island, lately reported that the Marble Bay mines, belonging to the Tacoma Steel Company, in 1905 mined and shipped 12,006 tons of ore to the smelter at Tacoma, Washington. The year's development work on these prop-

erties included deepening the main shaft 100 ft., drifts 430 ft., and winzes 200 ft. The lowest level is now 671 ft. below the surface and 620 ft. below sea-level, the mine being near to tide-water. Gold values are fully maintained and copper is increasing with depth. The average number of men employed last year was 50 white men and 12 Chinese ore-sorters.

The Van Anda mines were not worked the greater part of the year; at the Cordillero group about 100 tons of ore, taken out in doing development work, were got ready for shipment; a body of copper ore was opened on the Loyal group; the Puget Sound Iron Company did but little development work but in other ways made preparations for shipping large quantities of iron ore to Tacoma in 1906; while prospecting on other properties uncovered some fine showings of copper ore.

Zacatecas, Mex. June 12.

Tajos de Panuco is an appropriate name applied to a mining property, famous for an open cut, excavated upon a wide lode some 10 meters wide and 600 m. long, distant about 25 km. from the town of Zacatecas. The dumps lie only a mile from the village of Panuco. Built in the times of the "Conquistadores," every house shelters a family that has supported itself for generations by sorting and re-sorting the Tajos dumps. Initiation of operations on this ancient mine is contemporaneous with the laying of the first foundation stone in Zacatecas city. The Spaniards introduced the devices common to mining in the peninsula. They hoisted with the effective horse-whims, still used to-day, and treated the surface oxidized ores by the patio process. Records still extant refer to the silver production of the Tajos, melted and coined at the Zacatecas mint, beginning with the year 1560. With respect to size, few old mine dumps can compare with these surface accumulations, chiefly consisting of low grade vein matter. A remarkable circumstance, worthy of attention, is the number of men and women who found employment, until recently, in digging over, cleaning and marketing the apparently waste material. Tradition credits the miners of Zacatecas with having found sustenance in the Tajos dumps during periods when the rest of the district was suffering from "borrasco." Even to-day, after 300 years of picking, sifting and breaking, stones are found enclosing masses of pure massive sulphide of silver, known in the local vernacular as "petlanque." Concerning the values of the dump material sold to the local ore-buyers, examination of available books reveals the fact that for a period of many years the grade averaged one kilogram of silver per ton, associated with from three to four grams of gold. The patio reduction works usually paid a fixed price per mark, deducting from 8 to 15 pesos for treatment. Upon the advent of foreign ore-buyers the silver and gold was liquidated by troy ounces, according to New York quotation. A treatment rate was charged, based upon silica, lime and iron contents; in addition, a deduction was made for the freight rate to the smelter. During an evanescent boom, peculiar to Zacatecas, a native company was organized to drain and operate the mine. Insufficient capital caused their failure. The bottom was reached, considerable cleaning out was performed, and many workings found in ore. The deepest point measured only 110 m. from the surface; vein widths averaged 4½ m., while values seldom fell below 450 grams of silver per metric ton. At the close of 1891 the company, unable to raise the necessary capital for improvements, dissolved, the mine again filling with water. Within a month, the present owner, Senor Juan A. Petit, has succeeded in enlisting American capital for the re-opening of the mine. John P. McEwen, of New York, representing himself and others, has entered into a contract for this purpose. A steam hoisting engine is being placed; draining will be carried on through one of three shafts,* called the San Diego. An experienced mining man familiar with the mine, C. A. Bentley, will superintend all operations. It is this gentleman's belief that only eight weeks are required to effect complete drainage; another six months and the old workings will be in condition to supply ore. Estimates of an ore yield of 3000 tons per month are considered within the bounds of conservatism.

London. June 24.

I have frequently mentioned the Clitters United mines, Ltd., as the pioneer of modern practice in ore-dressing in Cornwall; that is to say, as the most important example of an old mine re-opened and old dump re-worked. The financial results of the company for 1905 are now at hand, and they show that the company is on a paying basis, having come to the end of the period when any more capital expenditure is required. Up to the end of last year a large proportion of the ore treated was for the dumps, but the development at both the Clitters and the Hingslon mines are opening up so well that in future the bulk of the ore will come from the stopes, with a small proportion of the dump added, thus increasing the average contents of the ore treated. During 1905 the total ore crushed was 23,975 tons, which yielded 134 tons of black tin, and 81 tons of wolfram, the two together bringing £18,300; in addition to which copper ore and refined arsenic brought the total receipts to £20,254. The company owns several other old properties in the neighborhood, and contemplates re-opening two of them—the Old Gunnislake and the Hawkmoor. In addition to tin, wolfram, arsenic and copper, the Old Gunnislake contains uranium minerals, especially the uranite of copper, and a few tons of this will make a substantial increase in the income. The prospects of the company are excellent, for the mines would appear to have an indefinite life before them, and the chief products, tin and wolfram, are stiff in price.

Operations at the Broken Hill mine in Rhodesia are proceeding apace. By the way, it is a pity that this name has been employed. As your readers are aware, the mine is an outcrop of silicate and carbonate of zinc, 374 miles north of the Victoria Falls, and 2016 miles from Cape Town. According to a recent report by R. J. Frecheville, already alluded to in these columns, the ore is suitable and plentiful, but distances are its enemy, difficult to annihilate. The latest news is that the railway from Victoria Falls has been completed, so that one of the obstacles to success has been removed. At the present time there are six calciners at work and six more are nearly completed. It is estimated that there are on hand some 8000 tons of roasted ore, averaging 60 per cent. zinc. It is stated that clay can be obtained locally, suitable for making zinc retorts, and that charcoal can be made from vegetation in the vicinity of the mine. I believe, however, that the best policy would be for the railways to grant special rates of freight to enable the mine to ship the calcined ore to Europe. It all depends on the "pull" which the directors have among the railway men, and the steamship companies.

The Um Rus Gold mines, in Egypt, are progressing slowly. Formed under John Taylor & Sons' auspices to work old mines, which ages ago probably yielded some of the wealth of the East, for three years development work has been actively prosecuted without finding any deposit of more than ordinary value. The network of veins opened up is extensive, but the pay-streaks are narrow and of variable value. Since March, 1905, a 10-stamp mill has been running, but not at full capacity, and has milled about 650 tons per month, running about 18⅓ days out of 30. The extraction has averaged $14 per ton, and the tailings are estimated to contain $3. Since this ore was mined, the average content of the ore developed has been less, and in many cases the ore-bodies have run as low as $8.50 per ton. The policy decided on this week is to spend a further round sum of money developing the ore systematically, and for this purpose an assessment of 5s. per share will provide £45,000 new capital.

Paris. June 22.

A rather important contract has been passed between the Societé Le Nickel and a New Caledonia mine-owner M. Brini, for 60,000 metric tons of nickel ore, the price being based on the figures of 12c. per kilogram of ore with 7 per cent. metal content.

General Mining News.

United States Steel Corporation—The immediate erection and completion of one finishing unit, the rail mill, with sufficient blast-furnace and steel-works capacity to provide for its requirements, and the installation of other finishing units as required, with their raw material accessories, is the scheme that has been adopted for the development of the plant of the Indiana Steel Company, a subsidiary company of the United Steel Corporation, at Gary, Ind.

The rail mill is to have a capacity of 75,000 tons a month, or 900,000 tons a year. The four blast furnaces which are to be immediately erected will have a daily output of 1,800 tons and the 28 open-hearth furnaces, 3000 tons. As the rail mill will require nearly 3000 tons of steel per day there will be no surplus, and the pig-metal output is also adjusted and provides for about 40 per cent. admixture of scrap. The blast furnaces under way are in the center of the ultimate group of 16, and the two open-hearth units are similarly located in the group of six open-hearth plants, which will ultimately contain 84 furnaces.

The contracts for the erection of the stoves and furnaces have already been awarded the Riter Conley Manufacturing Company, Pittsburg. The stacks will be 90 ft. high and will have a bosh diameter of 21 ft. 6 in. From these dimensions it is apparent that they have been designed with a view to the use of a fairly heavy percentage of fine ores. Each furnace will be provided with four stoves, 100 ft. high and 22 ft. in diameter. Gas-driven blowing engines will furnish air to the stacks, but these contracts have not yet been awarded.

ARKANSAS.

SALINE COUNTY.

Arkansas Soapstone and Refractories Manufacturing Company—This company has its main office in Little Rock and has started to work a soapstone deposit at Pinnacle, where it is building a manufacturing plant. Charles Tete, Jr., of Philadelphia, is president; Robert Kunstman, Little Rock, secretary and treasurer.

CALIFORNIA.

AMADOR COUNTY.

Gold Top—This mine is now in the hands of two of the principal creditors, who will clean up the bedrock in the endeavor to get the money due. It is doubtful whether it will be possible by this means to pay up all the debts.

BUTTE COUNTY.

Quartz—M. J. Cooney has made two locations in the gravel district at Cherokee, near the Spring Valley hydraulic mine. Heretofore no quartz has been worked in that district.

Gravel—Hendricks Brothers, of Oroville, and G. M. Reaves, of Magalia, have struck pay gravel in their mine on the Dogtown ridge six miles north of Cherokee. This may result in the resumption of work at the Blue Hog Ranch mine, of which this is supposed to be the extension.

EL DORADO COUNTY.

Mount Pleasant Mining Company—At this mine, Grizzly Flat, the shaft is being sunk from the 1000 to the 1100-ft. level. Three eight-hour shifts of men are engaged in the work. At the 1100-ft. level crosscuts will be run.

Havilah—The company, which has been operating this property at Nashville, has closed it down for good and the pumps have been withdrawn.

INYO COUNTY.

Golden Eagle—This is the name of the mine recently struck in the Panamint mountains near Emigrant Springs. The vein is a very wide one, yet carries high values in both gold and silver. Some 24 locations have been made in that vicinity, which is 12 miles west of Furnace Creek in Death Valley, and 28 miles southeast of Stove Pipe Springs.

MODOC COUNTY.

Hydraulic Ground—A. D. Gassaway, of Nevada City, and John Elbert, of San Francisco, have been recently at Mono Lake looking over the old hydraulic mining ground with a view to re-working it.

Elbert and others have been in possession of this ground for some time. They have made many efforts to put the property to the front, but on account of the scarcity of water have been unable to make much headway. The unlimited amount of snow deposited in the Sierras last winter gives encouragement to the owners to renew activity.

NEVADA COUNTY.

Conlin—In this mine, Grass Valley, being confident that the vein in the hanging wall, which was probably thrown there by faulting, is the original vein, and that the portion previously worked was merely a split, Manager Brunnier has put men to work on an upraise which he intends to carry to the surface. This upraise was started from the 300-ft. level and quite a distance from the shaft. It was commenced on the vein and has continued on it since. The vein shows great regularity and is just as rich above the level as it was at that point.

Central Consolidated Mining Company—At this mine the owners have grown tired of waiting for the electric pump to arrive from the East, and have put in a tank-hoist which is steadily lowering the water. In a short time the bottom of the old Central shaft will be reached. Development work will be carried on in the old workings on a large scale. Years ago this mine was given up as worked out. Under present-day methods, since the new company took hold, it has yielded well and keeps a 20-stamp mill going.

Jenny Lind Mining Company—In this property near Grass Valley, the crew at work has just struck pay gravel in such quantities that the announcement has been made that the mill will be started up as soon as it can be overhauled.

SHASTA COUNTY.

Washington Mining Company—This mine, near French Gulch, is being equipped with Burleigh drills, a gasolene engine and an air compressor. Walter Van Matre is superintendent. The Washington has been a famous producer, but for several years the mine was let out to leasers. Charles Webb, a leaser, struck it so rich a few months ago and did so well, that when his lease expired, three or four months since, he could not get a renewal.

YUBA COUNTY.

Bessie—This quartz claim is the newest mine in Browns Valley, 12 miles from Marysville. Byron Burris, the owner, has sunk a shaft 100 ft., and in a drift started from that point he has broken into a ledge that shows good values and promises well. The find is supposed to be a southerly extension of the Old Flag ledge.

COLORADO.

GILPIN COUNTY.

Pleasant Valley Mining Company—A good strike is reported at the main shaft at a depth of 200 ft., where a body of lead ore 3½ ft. wide has been opened up. The new concentrating mill is running regularly. R. L. Martin, Central City is manager.

Taawasa Gold Mining and Reduction Company—A new hoisting plant has been erected on the old shaft of the Aduddell. The company, in which New York capital is interested, has purchased the Lowell 100-ton concentrating plant at Idaho Springs and is arranging for the erection of an aërial tramway 10,800 ft. long to connect mine with mill. Office of the company is in Idaho Springs.

Six Day Mining and Milling Company—Denver and Eastern people have organized this company with capital stock of $300,000, leased and bonded the Mammoth property and Perigo 20-stamp mill at head of Gambel gulch. J. K. Seaman, Rollinsville, Colo., is manager.

Roderick Dhu Gold Mining Company—The annual meeting was held in Denver and the following were elected: President, L. P. Roy, Central City, Colo.; L. F. Butler, Denver, Colo., secretary and treasurer. Company has decided to lease the Protection property on Quartz hill.

Gauntlet Mines Company—This company has increased its capital stock and will arrange to resume operations on the Gauntlet group on east end of Quartz hill. L. D. Hobson, Central City, is manager.

O Be Cheerful—Denver and Central City people are interested and they are

opening up a good vein. L. P. Roy, Central City, is superintendent.

Snowdon Mines Company—A new organization will operate the Snowdon group in Silver Creek. G. F. Swartz, Apex, is secretary.

Polaris—Denver people have taken a lease on this property, in Pine Creek district. J. L. Walter, Apex, is in charge of property.

Old Town Consolidated Mines Company—Production to date for a period of 10 years is $1,700,000; dividends to amount of $130,000 have been paid. The company has a reserve of $75,000, and intends to sink its 1500-ft. shaft down to 2300 ft., and connect with lateral from Newhouse tunnel, which has been driven 1100 ft., but will have to be driven 3200 ft. further. G. K. Kimball, Jr., Idaho Springs, is manager.

Ralls County—After cleaning out the 500 or lower level, a 4-ft. vein of concentrating ores was found. C. Gage, Central City, is manager.

OURAY COUNTY.

Camp Bird, Ltd.—It will be remembered that this company's mill and other buildings were destroyed by a snowslide last March. The mill buildings have since been restored and new equipment recently purchased from the Allis-Chalmers Company, of Milwaukee, consisting of approximately 180 tons of stamp-mill and frue-vanning machinery. The new outfit includes eight grizzlies, 4 ft. x 11 ft. 4 in., and stamping machinery, including six 5-ton anvil blocks, 21 in. high, and eight mortars for 1050-lb. stamps. There were also ordered 30 standard 6-ft. frue-vanning machines complete.

SAN JUAN COUNTY.

Green Mountain Mining Company—This company's mill at Silverton, which was seriously damaged by a snowslide on March 17, has been rebuilt and is again in running order. This plant was designed and built complete by the Traylor Engineering Company and was only just completed at the time of the snowslide. As soon as the news of the damage was received in New York, orders were given to the Traylor Company to rebuild whatever was damaged, and work was begun at once. The reconstructed building is designed for two units of 140 tons capacity each per day, but only one will be operated at present. There is sufficient power to bring the output up to 200 tons whenever desired. Double eight-hour shifts will be run for the present, each shift requiring about 40 men in the mine and 20 in the mill. A novelty in this camp is the Traylor centripact screen. Eleven have been introduced in the Green Mountain mill. W. M. Turner, formerly of El Cobre Mining Company, of Santiago, Cuba, is the foreman of the mill, taking the place of D. R. Hickey, who lost his life in the snowslide which demolished the mill.

IDAHO.

BLAINE COUNTY.

Dollarhide—The mill has been shut down for a few days, in order to put in a settling tank for concentrates. A new Johnson concentrator, built by the Risdon Iron Works, San Francisco, is also being put in.

GEORGIA.

LUMPKIN COUNTY.

A sale has been made of a gold-mining tract of 300 acres at Auraria, near Dahlonega, to George F. Curry, J. W McIntosh and associates of Kansas City, Mo. They propose to work the tract on a large scale.

KENTUCKY.

CUMBERLAND COUNTY.

Marrow Coal and Coke Company—This company, recently incorporated, will develop 1100 acres of coal lands on Marrowbone creek. This property is under lease from the Big Sandy Company, and both the lower and upper coal seams are being opened by drift. When completed the plant will have a capacity of 1000 tons per day. Contracts for all construction work and supplies have been let, and plans are partially made for a central electric plant to supply power to the various operations on the creek. The company does not contemplate the construction of coke ovens at this time, but will probably erect 100 ovens later. Shipments of coal are expected to begin about Sept. 1. Officers of the company are: John F. McCracken, Lookout, Ky., president; J. M. Diffenbaugh, vice-president; F. N. Conn, Masontown, Pa., secretary; D. R. Anderson, treasurer; R. C. Peacock, Camden, N. J., general manager and consulting engineer.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Atlantic—Work has started on a cupriferous measure lying eastward from the old mine. It is an unidentified lode, known as the "Calico." There are three test-pits sinking. The northernmost one is 25 ft. deep and bottomed in sand and gravel. It will sink 10 ft. further before encountering the lode. The middle pit is down 25 ft. and in the lode. The other pit is 20 ft. deep and in the lode. At the explorations on section 16 the crosscut to the westward is still under way. It has passed through a formation which shows some copper and resembles the Baltic amygdaloid.

Baltic—No. 2 shaft of this mine went into commission this week as a regular producer and an increase of 20 per cent. in the mine's total production should result. It is provided with concrete skip roads and opened to the 8th level.

Franklin—This mine will not be able to increase its production largely until the fifth head installing in the mill is completed. Then work will be started repairing the others. The crosscut eastward from the old workings is still driving forward to intercept the Kearsarge bed.

King Philip—Sinking in the drop shaft has reached a depth of 65 ft., in solid rock. The shaft will be sunk in the footwall of the lode and far enough distant to permit the extraction of all the lode values.

Tamarack—No. 5 shaft is in commission again, but rock shipments have not reached normal proportions. Nos. 1 and 2 shafts are preparing to resume production.

Tecumseh—Sinking in No. 1 shaft has reached a depth of 675 ft. Excellent rock is coming to surface. As soon as milling facilities can be obtained a mill test will be made.

Winona—Work has started sinking the new No. 4 shaft. As there are only a few feet of overburden where it is located, no difficulty will be encountered in reaching rock.

KEWEENAW COUNTY—COPPER.

Keweenaw Central Railroad—Construction work is being pushed rapidly. Additional equipment has been purchased by the contractors to hasten the grading work. Trains will be running by September.

Keweenaw Copper Company—The second pit at the Mendota location has opened the Mendota vein and shows some copper.

ONTONAGON COUNTY—COPPER.

Michigan—Engineers are surveying the line for a railroad spur from the Duluth, South Shore & Atlantic tracks to the site of the new stamp-mill, at Keweenaw Bay. A force of men is engaged in clearing the land there, preparatory to starting work on the various buildings. Howard Brady, assistant superintendent, will move there in order to take personal charge of the work.

MONTANA.

SILVERBOW COUNTY.

Butte Coalition Mining Company—This company will abandon the smelter at Butte acquired from the Montana Ore Purchasing Company. The plant is run down and antiquated in design. The ore of the company will be hereafter reduced at the Washoe works, at Anaconda.

OREGON.

BAKER COUNTY.

Indiana Mining Company—At the annual meeting in Baker City, June 25, the following officers and directors were elected: President and general manager, John W. Messner; vice-president, J. W. McAlpine; secretary, W. G. Drowley; assistant secretary, E. E. Cleaver; auditor, Dr. A. Cleaver; treasurer, W. J. Stapish; directors, John W. Messner, E. E. Cleaver, Dr. A. Cleaver, Baker City, Ore.; G. F. Aldrich, Helena, Ohio; Hen-

ry Schies, Anderson, Ind.; W. L. Myers, Medical Springs, Ore.; Wm. Godejohan, Olney, Ill. The property is situated 25 miles east of Baker City in the copper belt, has been developed by tunnel and shaft work and is well supplied with machinery and other equipment.

BAKER COUNTY.

Elkhorn—This mine, 20 miles west of Baker City, has been known for years as a gold mine and has been worked with varying success. Recently, however, copper has been much in evidence. On the 400-ft. level an orebody has been found, which runs well in copper, carrying some gold also. The mine is now owned by F. P. Hays, of Philadelphia, and is in charge of Edward I. Field, as manager.

PENNSYLVANIA.

ANTHRACITE COAL.

In Philadelphia, June 27, the Pennsylvania Supreme Court gave its decision affirming the validity of the miners' certificate law. Under this act is is provided that a certificate of qualification is required before a miner can work in the anthracite mines of the State, and that two years of practical experience as an anthracite mine worker or laborer are necessary before the certificate can be obtained, experience in bituminous mines not being counted.

The opinion of the court affirms the judgment of the Lackawanna county court in the case of the Commonwealth against John Shaleen. The Superior Court upheld the provision of the law providing that a certificate was necessary, but declared that the section which required the experience was unconstitutional, because it discriminated against the citizens of other States who might seek employment in Pennsylvania. The decision of the Superior Court is therefore reversed.

TENNESSEE.

HAMILTON COUNTY.

Tennessee Refinery Company—This company has leased a tract near Chattanooga which is said to contain kaolin and feldspar. The company proposes to prepare these minerals for market. W. E. Ragsdale, Chattanooga, is manager.

TEXAS.

BRAZORIA COUNTY.

Hoskins Mound—Many operators have visited this field recently and all think the prospect encouraging. The formation is very similar to that of Spindletop, the ground rising to about 20 ft. above the surrounding prairie and it was the only place in the locality not inundated at the time of the Galveston flood. The Mound Oil Company has drilled five wells—accidents prevented the completion of two. One developed water, one is not completed and the remaining one, No. 2, is producing about 60 bbl. per hour. The output is being sent through a 4-in. pipeline to Danbury, a distance of 10 miles, where it is sold to the Santa Fe Railway. The showing made by the well is unusual for the Gulf region, in that the well is only 582 ft. deep and the drilling of a deep well near No. 2 will be anxiously followed by operators, who scent the prospect of a new gusher field which would materially affect prices.

UTAH.

BEAVER COUNTY.

Lulu Mining Company—An extension of the Horn Silver vein has been encountered on the 550 level and a drift is being run. The ore carries high values.

JUAB COUNTY.

Scranton—This zinc mine is producing about 40 tons of ore daily. The recent labor trouble has ended.

MORGAN COUNTY.

Carbonate Hill—At a recent meeting of shareholders of this company the management was instructed to install power drills, compressor and an aërial tramway. The company has been shipping considerable ore to the Salt Lake smelters. M. A. Daugherty, of Salt Lake, is general manager of the mine.

SALT LAKE COUNTY.

South Columbus—Development work has been resumed at this property. A tunnel is being driven.

Pioneer—The tunnel being driven to open this property has been run over 500 ft. in.

Utah Apex—A 5-ft. vein of high-grade silver-lead ore has been encountered in the Andy tunnel of this Bingham property. A carload shipped recently netted $30.89 per ton.

Columbus Consolidated—About 14 ft. of high-grade ore has been opened on the 300 level of this property. An average of 40 tons of crude ore is being shipped and the management claims the gross earnings are about $100,000 monthly.

Silver Shield—The new compressor plant at this property is about ready to go into commission. It will operate five drills.

SALT LAKE COUNTY.

Boston Consolidated—This company has installed its first steam shovel for mining its porphyry ore. The second shovel will be put in commission next September.

Consolidated Flagstaff—The new compressor plant, ordered some time ago, is being installed at Alta.

New Red Wing—There has been a hitch in the plans to build a mill for this Bingham property. However, it is said the plant will be built this year. W. C. Orem, of Salt Lake is manager.

Utah Apex—The preliminary survey for a 2400-ft. track to connect the mine with the Copper Belt railroad, in Bingham has been completed.

SUMMIT COUNTY.

Thompson Mining Company—It is understood the management of this mine will soon start development work again.

Ontario Drain Tunnel—Good progress is being made with the work of opening this closed adit. The drift being run around the caved section is in hard rock, removing the necessity of timbers.

SUMMIT COUNTY.

West Quincy—A carload of machinery, including a Davis calyx core drill, has arrived. The drill is being set up on the 400 level to prospect the mine to depth.

New York Bonanza—Development of the streak of rich ore recently encountered on the 700 level still continues, with encouraging results.

Magnolia-St. Louis—The new shaft has been dropped below the 300-ft. point. It is expected the orebodies opened from workings run from the Silver King mine will be tapped at about 500 ft. depth.

TOOELE COUNTY.

Garrison-Monster—A vein of 5 ft. of high-grade galena has been opened in this mine.

Gold Hill—This is a copper property and is being developed by Capt. Duncan MacVichie, manager of the Bingham Consolidated, and associates. During the past few weeks bodies of low-grade copper ore have been opened.

WASHINGTON.

CHELAN COUNTY.

Holden Group—Several engineers have been examining this property lately, and it is reported that 100 miners are to be employed as the result of their report. Jay P. Graves, manager of the Granby Company, is said to be interested in the Holden mine, which has large reserves of low-grade ore. He is interested with Dr. N. G. Blalock, of Walla Walla, Wash., who has filed a claim on lake Chelan, as a storage reservoir, and also on a flow of 3500 cu.ft. of water in the Chelan river for the generation of power, which it is believed will be used to operate an electric railroad between lake Chelan and Spokane.

OKANOGAN COUNTY.

Palmer Mountain Mining, Tunnel and Power Company—This company has closed a contract with the Traylor Engineering Company, of New York, for a 100-stamp mill to be built at once. The contract was made at the New York office of the Palmer Mountain Company, 50 Wall street, through negotiations carried on by General Manager John W. Boyd. The Traylor Company is to complete the shipment of the machinery in 90 days.

Horn Silver Group—Some good ore was discovered some years ago. Spokane, Wash., people have taken hold and will start development work on it.

Copper World Extension—The sinking

of the shaft below the 200-ft. level is progressing. After the arrival of minor equipment needed, another power drill will be put in commision.

Copper World—Good ore is reported to have been encountered in the incline shaft and also a little native copper.

Pinnacle—The working force will be increased and the lower tunnel pushed ahead more rapidly.

WEST VIRGINIA.

MINGO COUNTY.

Hinsch Coal and Coke Company—This company, with headquarters in Cincinnati, O., has bought the properties of several small coal companies operating near Williamson. The combined properties have an output of about 1500 tons per day.

General Mining News.

CANADA.

NOVA SCOTIA.

The iron and coal industries of Nova Scotia are suffering at present from a shortage of unskilled labor, which threatens seriously to affect the output. The production of the Dominion Coal Company's mines at Sydney has been considerably lessened, owing to this cause. The Dominion Iron and Steel Company is unable to get the labor required at the iron mines at Wabauna, Newfoundland, and the output is insufficient to keep going the three steamers chartered for the summer to convey raw material to the Sydney plant. Wages for unskilled labor are at present $1.40 per day at the steel work, and $1.50 at the mines, which is considerably lower than the wages paid by contractors and an advance shortly is anticipated.

The Dominion Iron and Steel Company contemplates extending its plant in order to enable the steel rod mill to be worked to its full capacity of 70,000 tons per year. At present it is dependent on orders from outside wire mills, which hitherto have not been sufficient to keep the mill running continuously. H. E. Rice, lately superintendent of the rod mill, states that it is necessary to have a mill at Sydney for the manufacture of the rods into wire nails and wire fencing, the demand for which is constantly increasing with the settlement of the Northwest.

Six thousand tons of steel rails manufactured at the Sydney plant were shipped on June 11 from that point to Seattle around Cape Horn by the steamer "Boverie" to be transhipped to British Columbia for use on J. J. Hill's railway. This was done because the cost of land transportation is higher than the ocean freight.

Dominion Iron and Steel Company—The report of this company for the year ending May 31, shows that the net earnings were $1,406,305; charges $753,711; leaving a balance of $652,594. The deficit carried over from previous year was $1,021,709 and is now reduced to $369,115. The reports says: "During the past six months the output has been much increased, and the quality of the product maintained. The total sales for the year were: Pig iron, 25,393 tons; billets and blooms, 17,145 tons; rails, 101,245 tons; wire rods, 45,553 tons. The production in the rail mill in May, 15,046 gross tons, was the largest monthly tonnage reached, but it has been denomstrated that the capacity of the mill is 22,000 to 25,000 tons per month. The rod mill in January rolled 7400 gross tons of wire rods, but we have unfortunately been unable to operate this mill continuously, as the production would exceed the consumption in Canada.

"The bounties on our pig iron and steel ingots will, on July 1 next, be reduced to $0.70 and $1.05 per ton, respectively, and unless extended they will cease altogether on June 30, 1907. We derived from these bounties during the year $638,652; on the reduced scale of the coming year, if the average production of the past six months is maintained, they would amount to $491,605."

ONTARIO.

At the Helen mine, on the Michipicoten range, owned by the Clergue syndicate, mining is carried along this year with about the speed of last season; and though there has been a fire that destroyed buildings containing the crusher engines, machine shops, etc., the output of the year will be about as usual. This mine is operated by the Lake Superior Company, and the bulk of its product goes to the United States. Its owner prefers to buy Lake bessemer ores for the Sault mills rather than attempt to use this Canadian ore. Explorations in Canada for bessemers, notably magnetites, are meeting with some encouragement, and the Atikokan Iron Company, which has a large deposits west of Lake Superior, expects to be smelting its own ores by winter.

MEXICO.

JALISCO.

Amparo Mining Company—This company is having plans prepared for a reduction plant with a capacity of 200 tons a day, to beneficiate the ores from the Santa Dominguez and other mines owned by the company in the Etzatlan district, The plant will have an 80-stamp mill, concentrating tables and cyanide tanks. Shipments from the Santo Dominguez now average 2½ carloads daily. The net earnings of the company last year were about $450,000 Mexican. The plans are being prepared by Paul Clever, engineer for the company.

OAXACA.

Coal is reported to have been found near Chuapam in this State, and the deposits are now being examined by J. B. Lafargue, a French engineer, for the owners, who are residents of Oaxaca. The point is about 80 km. from the line of the Mexican Southern Railroad.

SAN LUIS POTOSI.

Concepcion—It is reported that this mine, in the Catorce district, is to be transferred to an American company. For several years the mine has been worked only on a small scale; but the Concepcion is one of the famous old mines of Catorce.

SONORA.

Cananea Consolidated Copper Company—Despite the rumors to the contrary the plant of the company, was not injured and for the past 10 days everything has been running as smoothly as before the strike. The only property loss was the main lumber yard.

Among the other Cananea mines which were affected by the strike were the America mine, owned by Los Angeles people; the Cananea-Duluth, owned by Michigan people; and the Sierra de Cobre, owned by the Copper Queen company. The miners employed in these mines were forced to go on strike by the agitators but returned to work as soon as possible.

TEPIC.

In the Territory of Tepic, quite a boom is on at Amatlan de Cañas, where gold and silver veins have been found on a large tract controlled by J. J. Mendez, John Hart, and others.

AUSTRALIA.

NEW SOUTH WALES.

The proprietors of the Northern Collieries in New South Wales have, after a series of conferences, decided to increase the selling price of best Newcastle coal to 10s. a ton, to take effect from 1st January next. This decision carries with it a proportionate increase in the mining rate and daily wages of the miners and employees.

TASMANIA.

The half-yearly report of the Mount Lyell Company has now been issued, and the net profits are shown to be even better than anticipated, amounting to no less than £255,648. This is an increase of £67,039 over the preceding six months. The financial position of the company is shown by the fact that after providing for all outstanding liabilities, except debentures which amount to £76,720, the liquid assets represent a surplus of £514,000. A further dividend and bonus absorbing £150,000 were declared, which brings the total amount distributed by the present company up to £495,000. At the 700-ft. level in the North Lyell mine a body of rich ore has recently been struck, some of it assaying as high as 40 per cent. copper. The location of ore of this quality goes far to demonstrate the future possibilities of this mine at a depth. Work was interrupted for some little time by heavy floods, but the damage is now being made good and work is again in full swing.

VICTORIA.

In the State of Victoria the gold industry is buoyant, the activity on the Bendigo field being specially marked. Recently some 27 tons of quartz were mined from a depth of 4224 ft. in the New Chum Railway mine, and on treatment a yield of 21 oz. of gold was obtained. This result, taken with the high payable returns contributed by the other mines on the field, has given a marked stimulus to operations, and prospecting on areas hitherto neglected is being carried on with great vigor. The Long Tunnel Company, Walhalla, has experienced a prosperous half-year, the net profit amounting to £10,629. During this period the company crushed 13,224 tons for a yield of 9,116 oz. of gold, the average being 13¾ dwt. per ton.

EUROPE.

SPAIN.

Messrs. Barrington & Holt write from Cartagena, Spain, under date of May 26: "A new and important group of mines will shortly start work in the Calasparra district. Owing to the large mass of ore they have been proved to contain and with the construction of a cable from the mines to the main line, it is anticipated that a large quantity of ore can be worked with a profitable result. This mineral is magnetic ore running in the neighborhood of about 60 per cent. iron.

Coal Trade Review.

NEW YORK, July 3.

Notwithstanding the settlement in Ohio, there is still trouble, and another outbreak in violence is reported at Dillonvale. The settlement with the operators who did not join with the State association may yet cause some trouble.

Elsewhere, matters are going smoothly, and there is general resumption of work. The strike in the central region of Pennsylvania is persistent. There is, however, an abundant supply of coal everywhere, and that condition is not likely to be affected by the few difficulties still unadjusted.

COAL TRAFFIC NOTES.

The coal trade and coke traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to June 23, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	2,751,232	1,985,702	D. 265,530
Bituminous.....	13,356,147	14,940,729	I. 1,584,582
Coke.....	5,268,066	6,063,841	I. 795,675
Total.....	20,875,445	22,990,172	I. 2,114,727

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending June 30 were 11,965 tons; for the year to June 30, they were 384,639 tons.

Coal shipments originating on the Southern Railway for the four months ending April 30 were: Tennessee district, 588,895; Alabama district, 627,906; total, 1,216,801 short tons.

New York. July 3.

ANTHRACITE.

The hard-coal market is becoming quieter and quieter. This week will be a short one with all companies and work will be entirely suspended throughout the week by some of the larger companies, notably the Reading and the Lehigh & Wilkes-Barre. Other companies are mining regularly and are disposing of their product about as fast as it reaches New York, although it is mainly distributed to small current orders. No hope of relief is visible before the early fall.

Prices on the prepared sizes advance this week by 10c. per ton and will remain throughout July as follows: $4.55 for broken and $4.80 for egg, stove and chestnut sizes. For steam sizes: $3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice and $1.30@1.35 for barley f.o.b. New York harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft-coal trade continues dull and the tonnages coming forward are much curtailed. The blockade of coal at Port Reading is not considered important, although shippers are just now completely cut off from cargoes to that point. The trade does not look for any improvement until September. Contractors are not taking on the proportion of coal that they should. If this keeps up, a large number of consumers are likely to run short at about the same time, in the early fall, and this, with the limited degree to which they are laying in stocks, will create a strong fall demand.

The strike situation in central Pennsylvania seems to be little changed. A number of operations have started up since the beginning of the strike, but the men seem to be hanging out at the instigation of their union, notwithstanding their willingness to return to work at the present schedule.

Trade in the far East is quiet; even contract orders are scarce, and where an order is placed under pressure the consignee is inclined to place freight limits which hold shipments back for a week at a time. The Sound is inactive, if anything, more so than farther east. New York harbor trade is dull and consumers do not appear to be in any hurry to take on coal. Prices range, as last week, around $2.50@2.75 for good steam grades and $2.40@2.50 for gas coal. All-rail trade shows a variable activity, with a little spurt now and again which falls off almost immediately. Transportation is good and car supply is sufficient, except to embargoed points.

Vessels in the coastwise market are scarce, and yet freights remain low. Other commodities are using up many of the vessels ordinarily confined to the coal trade, at higher rates than they could get for carrying coal. Indeed we hear of some vessels sailing east under light cargoes in order to get the higher freights coming back again. Current rates from Philadelphia are quoted as follows: To Boston, Salem and Portland, 60@70c.; to Lynn and Newburyport, 80@85c.; to Portsmouth, 70@75c.; to Bath, 70c.; to the Sound, 60c.; to Saco, 90c. and towages.

Birmingham. July 2.

A few of the commercial coal operators in Alabama have yet to sign contracts with the union miners, and some of the mines will be closed for a few days. Another meeting of the Commercial Coal Operators' Association will be held this week to consider the contract.

Chief Mine Inspector J. M. Gray announces that there were 53 fatal accidents in the coal mines of Alabama during the first six months of the year. Two of the deaths, however, were from heart failure. During the first half of 1905 there were 64 fatal accidents. The inspector announces that he will enforce the law against the use of dynamite in the mines, and that the rules he promulgated a few weeks since will be carried out to the letter, and he states that he will take the enforcement of the rules into the courts, if necessary.

Chicago. July 2.

Sales of anthracite have increased remarkably in the last week; otherwise there is no important change in the local wholesale coal market. The increase in the demand for anthracite is probably due to the desire of buyers to take advantage of the 10c. lower price on June anthracite than on July. This, however, does not wholly explain the sudden increase; for both consumers and retailers have been indifferent for more than a year to the monthly discounts, buying largely only when there was actual need of the coal. It is probable that advertising by retailers has had something to do with the increase of sales. Whatever the cause, the demand is in excess of the supply now coming forward.

The bituminous market continues dull; supplies are heavy from Illinois and Indiana mines, with no large buying. There is a desire on the part of many consumers for the signing of new contracts at low prices, now that the labor troubles are settled, and this demand is being met in many quarters. Operators and sales agents, however, are in general holding off from contract relations in the hope of a better open market as soon as the large stocks laid in by consumers prior to the beginning of the strike at Western mines shall become exhausted. It seems hardly probable that this hope will be realized.

Prices continue low in the open market. Illinois and Indiana run-of-mine bringing $1.50@2, and screenings—largely in demand—$1.35@1.65; what little lump is sold brings $1.80@2.50.

Eastern coals are quiet, the market for

them being naturally light in the summer. Smokeless holds up well to the standard price of $3.30 for run-of-mine. Hocking is in light supply and demand, at $3.15. Youghiogheny is in relatively good demand at $3.15 for three-quarter, though not a large amount of this coal is used in Chicago territory.

Cleveland. July 2.

Many of the coal mines in the middle district have resumed operations, and have shipped a good deal of coal into this territory during the past week. Others have not as yet started and are still dickering with their men over terms. Those who are in this position have no large contracts requiring immediate resumption of mining. Those firms which have resumed operations, however, have large contracts either with railroads or up lake consignees which have to be taken care of. It is understood that contracts of this kind aggregate about 5,000,000 tons of coal, hence the necessity to begin operations at once if these are to be filled before the end of the season of navigation. The demand for lake boats has consequently been heavy. The existing basis of prices is $2.15 f.o.b. boats, Lake Erie ports, for lake three-quarter.

The demand in this immediate territory has not been so urgent. At the time the strike was called stocks in the consumers' yards were copious. Most of these have not been worked off, since the consumers have been buying steadily, not knowing how long the strike in the middle district was going to continue. The demand has been steady, but prices have not been affected. Mine-run steam coal has been selling at $1@1.05 at the mines with slack at 75@80c. at the mines.

Coke is stronger, the best grades of 72-hour foundry selling at $3 at the oven, and furnace coke at $2.50 to $2.60 at the oven.

Hartshorne, Ind. Ter. June 28.

All the mines in the Indian Territory have now resumed work in compliance with the agreement entered into with the operators at Kansas City, Mo., June 16, 1906.

Some of the Arkansas mines are still idle on account of local differences, but the miners' district president, Peter Henraty, and the operators' commissioner, Bennett Brown, are now in that field straightening these matters out, and expect to have all mines running at an early date.

Indianapolis. June 25.

The first strike since the new agreement went into effect in this State occurred June 20, when the miners in the New Summit mine near Linton walked out. About 300 men are idle. Under the new contract agreement no miners can call a strike while the mine is in workable condition, and in case they do each miner is fined $1 a day for every day the mine is idle. If the operator is responsible for the strike, which is claimed to be true in this case, he is liable to a fine of $50 for each day the mine is idle. The trouble at this mine is said to be a test, because it arises over the slate, and each side contends that it is the duty of the other to remove it. At the headquarters of the Mine Workers it is claimed that the strike does not come under the provision in the wage contract imposing fines on either the operator or the miners for causing a suspension without first submitting the disputed question to arbitration. The position taken is that it is not a disputed question and that the 300 men had a perfect right to quit work. The operator wished them to remove slate. The contract provides that as to handling slate old conditions should continue, and the miners say that at this mine the men were not required to remove it.

It is also reported that 450 men at the United Fourth Vein Company's mines near Linton are on a strike because of the discharge of engineers. It is claimed that this strike without submitting the question as to the cause of discharge of engineers to arbitration, would make the miners liable under the new clause in the wage contract of miners imposing a fine. The adjustment of this matter is regarded with interest, since penalties may be imposed.

Indiana coal-mine operators are greatly pleased to learn that the coal-carrying railroads will hereafter be required to make car distribution public. In the past no mine owner knew the rates of his competitor's mine or how many cars he got. He frequently made a guess and sometimes complained of discrimination. His complaint was often justified, but no satisfaction was obtained from its presentation. It is now hoped that it will be made possible for mine owners to know every day their rating and the number of cars placed at the disposal of each.

Pittsburg. July 2.

Coal—A serious scarcity of railroad cars interfered with the operation of the mines in the Pittsburg district last week, some mines only running four days. The supply is adequate today, and all mines are in operation, but it is not expected that this will continue through the week. The demand is heavy and an advance in prices has been ordered and is in effect. The new prices are: Mine-run, $1.20; ¾-in., $1.30; 1¼-in., $1.40; 2-in., $1.55; nut, $1.10; slack 90c. all f.o.b. mine.

Connellsville Coke—Coke prices are stronger, furnace being quoted at $2.40@2.50 and foundry at $2.65@2.85 a ton. The *Courier* gives the production for the week at 272,523 tons and the shipments aggregated 14,774 cars distributed as follows: To Pittsburg, 4858 cars; to points in the west, 8026 cars; to points east of Connellsville, 1890 cars. The production in the lower Connellsville region amounted to 103,989 tons.

Foreign Coal Trade.

July 3.

Exports of coal and coke from the United States for the five months ending May 31, are reported as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1905.	1906.	Changes.
Anthracite	914,559	644,888	D. 269,671
Bituminous	2,471,290	2,709,699	I. 238,409
Total coal	3,385,849	3,354,587	D. 31,262
Coke	242,248	306,490	I. 64,242
Total	3,628,097	3,661,077	I. 32,980

The coke exported went chiefly to Mexico, though some was taken by Canadian furnaces. The disposition of the coal was as follows:

	1905.	1906.	Changes.
Canada	2,372,910	2,314,882	D. 58,028
Mexico	423,329	446,231	I. 22,902
Cuba	226,252	327,204	I. 100,952
Other W. Indies	131,875	140,654	I. 8,779
France	405	1,866	I. 1,461
Italy	29,512	18,650	D. 10,862
Other Europe	12,518	14,171	I. 1,653
Other countries	189,048	90,929	D. 98,119
Total	3,385,849	3,354,587	D. 31,262

The coal to other countries goes chiefly to South America. Canada took this year 69 per cent. of all the coal shipped. The exports to Canada in detail were:

	1905.	1906.	Changes.
Anthracite	897 068	626,583	D. 270,485
Bituminous	1,475,842	1,688,299	I 212,457
Total	2,372,910	2 314 882	D 58,028

There was a loss of 30.1 per cent. in anthracite this year, and a gain of 14.4 per cent in bituminous.

Imports of coal and coke into the United States for the five months ending May 31 were as follows:

	1905.	1906.	Changes.
Canada	551,105	695,920	I. 144,815
Great Britain	20,520	66,461	I. 45 941
Other Europe	113	4,037	I. 3,924
Japan	32,641	11,496	D. 21 145
Australia	49,790	80,108	I. 30 318
Other countries	38	64	I. 26
Total coal	654,207	858,086	I. 203,879
Coke	.....	50,053	I. 50 053
Total	654 207	908,139	I. 253,932

Coke was not reported separately in 1905. It is nearly all from British Columbia, though a little comes from Germany. The coal imports are chiefly on the Pacific Coast, but some Nova Scotia coal comes to New England ports. Of the coal imported this year 9256 tons are classed as anthracite.

Iron Trade Review.

NEW YORK, July 3.

The feature of the market is the absence of any indication of the usual midsummer dulness. Business everywhere has kept up in a way unprecedented for the last week of June and the opening one of July. The holiday this week will be cut down as much as possible by most mills, and there will be little stopping for repairs, except where it is absolutely

necessary. Specifications on contracts are being crowded in structural steel and some other lines. The demand for bessemer and basic pig keeps up; and that for foundry iron is better. The effect of the cut in Southern iron has almost disappeared. The Southern furnaces secured a large tonnage, and now inclined to maintain prices, apparently.

Two steamers arrived at Baltimore last week with 9280 tons of Swedish iron ore, shipped from the port of Narvik, Norway. This is the first ore of these Swedish mines received in America. It is high grade, analyzing about 69 per cent. iron. The ocean freight was $2 per ton. In addition to these two cargoes received by the Maryland Steel Company, it is understood other steamers will shortly arrive with similar ore.

Exports and Imports—Exports of iron and steel, including machinery, from the United States for the five months ending May 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor.:

	1905.	1906.	Changes.
May	$12,118,696	$15,685,322	I. $ 3,566,626
Five months	54,348,198	71,139,110	I. 16,790,912

This shows a gain of 29.4 per cent. in May, and of 30.9 per cent. for the five months. The chief items of the iron and steel exports for the five months were, in long tons:

	1905.	1906.	Changes.
Pig iron	28,069	28,209	I. 140
Billets, ingots & blooms	84,296	112,152	I. 27,856
Bars	26,910	36 437	I. 9,527
Rails	106,586	153,730	I. 47,144
Sheets and plates	27,580	42,132	I. 14,552
Structural steel	33 979	40,691	I. 6,712
Wire	54,369	73,162	I. 18,793
Nails and spikes	20,537	30,033	I. 9,496

There were considerable gains in all items except pig iron.

Imports of iron and steel into the United States—including machinery—for May and the five months ending May 31, are valued as follows:

	1905.	1906.	Changes.
May	$2,475,906	$2,859,492	I. $383.586
Five months	10,334,133	12,736,649	I. 2,402,516

This is a gain of 15.5 per cent. in April, and of 23.2 per cent. in five months. The chief items of the iron and steel exports for the five months were, in long tons:

	1905.	1906.	Changes.
Pig iron	70,379	124,644	I. 54,265
Scrap	6,100	9,358	I. 3,258
Ingots, blooms, etc	10,897	8,424	D. 2,473
Bars	11,938	11 930	D. 8
Wire-rods	6,543	6,892	I. 349
Tin-plates	30,611	19,767	D. 10,844

Anticipations of larger imports have not been fulfilled so far this year.

Iron Ore Movement—Exports and imports of iron ore for the five months ending May 31 were in long tons:

	1905.	1906.	Changes.
Exports	21,683	43,246	I. 21,563
Imports	363,488	476,554	I. 112,066

The exports were chiefly to Canada. The imports were largely from Cuba, though some ore came from Spain and Newfoundland.

Imports of manganese ore for the five months were 120,986 tons in 1905, and 68,459 tons in 1906; a decrease of 52,527 tons this year.

Birmingham. July 2.

Pig-iron quotations in the Southern territory have again struck a steady level, No. 2 foundry being quoted all around at $13.50 per ton. The sales of iron on a basis of $13 and even $13.25 per ton seem to be over, though it is admitted that there has been considerable iron sold at that price. At $13.50 the sales have been steady, and the aggregate is said to be considerable. Orders have been booked which will take up a large amount of the probable make for the next four months, and others are in sight which will cover the present output for the balance of the year. The consummation of the deal for the purchase by the Tennessee-Republic Company of the Birmingham Southern Railway, which consists of lines operating to and around the various industries of the Tennessee Coal, Iron & Railroad Company, is announced, the price paid being between $1,300,000 and $1,400,000. The Southern Railway and the Louisville & Nashville, jointly, purchased the railroad from the Tennessee Coal, Iron & Railroad Company several months ago, paying therefore $1,100,000. The difference paid by the Tennessee-Republic Company practically pays for the improvements made. John A. Topping, president of the Republic Company, and chairman of the Executive Committee of the Tennessee Company has been chosen for president of the Birmingham Southern railroad. Jones G. More, former president, goes with the Sloss-Sheffield Steel & Iron Company, in charge of mining operations

Cleveland. July 2.

Iron Ore—It is now evident that the mines at the head of the lakes will not be able to ship their full quota of 33,000,000 tons of ore this season. This is due chiefly to a shortage of labor. The shortage is principally in the higher grades of ore, and there is an advance in price, whenever any is for sale. Bessemer Old Range will bring easily $4.50@4.75 f.o.b. Lake Erie ports. The curtailment possible in the total movement is easing the freight market. Instead of a possible advance the market is holding about steady.

Pig Iron—The furnaces which went out of blast two weeks ago are still idle. This results in a shortage of foundry for spot shipments and consumers are offering premiums. It has brought about the sale of big blocks of Southern iron and stiffened prices all around. Northern No. 2 is now firmly established on the basis of $17 in the Valleys, while Southern No. 2 has advanced to $13.25@13.50, Birmingham.

Finished Material—Buying of new ships and some big repair work is increasing the demand for structural shapes and plates. During the week 8000 tons of ship material was contracted to cover two new orders just placed. Bar iron is short because the mills are closing down for repairs. Billets are short also, the forging quality selling for $34@35 Cleveland. Sheets are strong, with good buying both out of stock and from the mills.

Chicago. July 2.

Strength, unusual for the summer season and unexpected by the trade, marks the local iron market. The consumption of iron is increasing daily with the resumption of work by more foundries that have found it possible to combat the molders' strike. Demands are heavy for iron products and this fact combined with the absence of eastern irons from the local market has caused firmer prices on Southern. Little if any Southern No. 2 is now being sold here for less than $13.50 Birmingham ($17.40 Chicago). Northern holds up, $18 remaining the standard price, from which there practically is no deviation.

Scarcity of iron, indeed, is reported by local agents and it is said to be difficult for melters who have put off ordering until in actual need of the iron, to get enough promptly.

Coke is plentiful without any significant change in buying or prices, the market being quiet.

New York. July 3.

Pig Iron—The feature has been large buying by pipe-makers and other foundry interests. The business done for the week has been unusual in amount for a month so close to midsummer.

Current quotations for pig iron are, for New York or parallel delivery:

Northern:	
No. 1 X foundry	$18.50@$19
No. 2 X foundry	17.75@18.50
No. 2 plain	17.25@17.75
Forge pig	16@16.50
Southern:	
No. 1 foundry	17.50@18
No. 2 foundry	17@17.50
No. 3 foundry	16.50@16.75
No. 4 foundry	15.50@16
No. 1 soft	17 50@18
No. 2 soft	17@17.50
Gray forge	15@15.50
Basic pig:	
Northern	17.50@17.75
Virginia	18.60
Alabama	17.75@18.25

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Bars—Bar iron has sold rather freely, but at some concession, prices being 1.545@1.645c. tidewater. Steel bars are still quoted 1.645c. Store trade is fair, at 1.75c. delivered.

Plates—Tank plates are quoted 1.745@1.825c., tidewater, according to width. Flange and boiler are 1.845, and fire-box 2.045c. Jobbers ask higher prices.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater de-

livery. A large part of the business here is done by jobbers, who are asking 2.50c. for beams and channels out of stock.

Pittsburg. July 2.

There seems to be a short supply of bessemer and basic, and the Steel Corporation has not got the July iron it wanted. Instead the Carnegie Steel Company bought about 15,000 tons of heavy melting scrap for July, paying $16 delivered. There does not seem to be a plentiful supply of scrap and prices may be advanced as the demand will increase owing to the shortage of bessemer pig. The break in the Southern pig-iron market did not affect conditions in this district to any great extent. There has not been a demand for foundry iron for several weeks and prices are still low. A sale of No. 2 grade was made the other day on a basis of $16, Valley furnaces. It was for Pittsburg delivery but did not come from the valley. This makes the spread between bessemer and No. 2 foundry $1.75 a ton, the largest known for years. The foundries have deferred buying for future requirements owing to the threatened trouble with the molders. No move has yet been made by the Iron Molders Union of North America to enforce the demand made over a month ago for an advance of 20c. a day for its members, but since May 1 it has been collecting weekly assessments for a defense fund which, it is believed, is to be used to make a determined fight in the Pittsburg district. The annual agreement with some foundries expired on June 30 but so far nothing has been done looking to a renewal and it seems possible that the delay is for the purpose of enforcing a general demand.

The steel market continues strong, although there is no extensive buying in any of the finished lines which is not expected at this period of the year. Prices in all lines are firm and in some instances premiums may have to be paid in order to insure delivery. Business in structural material and plates continues to be placed and the mills are crowded with orders. In sheets and tin-plate trade is particularly active, and the mills are away behind in deliveries. The American Sheet and Tin Plate Company started its Shenango works, a 30-mill plant at New Castle, this morning, after a two-weeks' shut down for repairs, and is now operating 183 of its 258 tin-plate mills. Some of the independent sheet and tin-plate companies closed their plants June 30, when the agreement with the Amalgamated Association of Iron, Steel and Tin Workers expired and refuse to sign the new scale accepted by the American Company. The officials of the workers' organization do not believe the suspension will continue long. The demand for sheets and tin-plate is very heavy and the high prices recently established are easily obtained. There is an improvement in merchant steel bars but common iron bars are weak.

Pig Iron—Sales of pig iron recorded during the week aggregate over 25,000 tons. The most important transaction was the purchase by the United States Steel Corporation of 10,000 tons of bessemer iron for September delivery. For July shipment lots of 300, 500 and 1000 tons were sold by one furnace interest at $17.75, Valley furnaces. Another furnace sold 2000 tons for third quarter at that price. Two sales of 4000 tons each were made for second-half delivery. One Pittsburg consumer bought 500 tons of foundry No. 2 on a basis of $16, Valley furnace, the delivered rate being $16.85; also 500 tons of No. 3 grade at $16.35 delivered, but the iron did not some from the Valley but from an outside furnace. The same concern also bought 500 tons of bessemer iron, paying $17.75, Valley. Several small sales of basic iron were made at $17.25, Valley and one of 2500 tons was made today at $17.50. Foundry No. 2 is quoted at $16@16.25 and gray forge at $15.50, Valley.

Steel—The market is quiet but billets continue scarce and are quoted at $27 for both bessemer and open-hearth. Sheet and tin-bars are firm at $29. Plates remain at 1.60c. and merchant steel bars at 1.50c.

Sheets—Mills are still about six weeks behind in deliveries of black sheets and about three months behind on galvanized. The established prices are firmly maintained, black sheets being quoted at 2.50c. and galvanized at 3.55c. for No. 28 gage.

Ferro-Manganese—The market is stronger and 80 per cent. for July shipment is quoted at $90@95 and for the rest of the third quarter at $80@85 per ton.

Cartagena, Spain. June 16.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were one cargo, 5450 tons dry ore, to Rotterdam; two cargoes, 4700 tons dry ore, and two cargoes 5750 tons manganiferous, to Great Britain. Business continues active. Through the operations of the Pumping Syndicate, the water in the mines continues to decrease, and various mines have already been able to resume sinking operations in their shafts.

Quotations are unchanged, at 8s. 8d.@ 8s. 11d. for ordinary 50 per cent. ore; 9s. 2d.@9. 5d. for special low phosphorus ore; 12s. 1d. for specular ore, 58 per cent.; 10s. 3d. for S. P. Campanil. Manganiferous ores range from 11s. 10d. for 35 per cent. iron and 12 manganese up to 18s. 3d. for 20 per cent. iron and 20 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are quoted at 10s. 8d. per ton, f.o.b. shipping port. Exports for the week were 770 tons iron pyrites to France.

Dusseldorf, Germany. June 25.

Imports of iron and steel into Germany for the four months ending April 30 were as follows, in metric tons:

	1905.	1906.	Changes.
Iron and steel	91,934	143 869	I. 51,935
Machinery	22,347	27,781	I. 5,434
Total	114,281	171,650	I. 57,369

Imports of iron ore this year were 1,246,061 tons; of manganese ore, 50,262 tons.

Exports of iron and steel for the four months were:

	1905.	1906.	Changes.
Iron and steel	962,744	1,207 792	I. 245,048
Machinery	88,764	92,203	I. 3,439
Total	1,051,508	1.299,995	I. 248,487

Exports of iron ore, chiefly to France and Belgium, were 600,759 tons; of manganese ore, 340 tons. The increase in export trade this year was 24.6 per cent., a notable gain.

The Imperial Statistical Office reports production of pig iron, for the full years given, as below, in metric tons:

	1904.	1905.	Changes.
Foundry iron	1.740,279	1,797,680	I. 57,401
Direct castings	56,072	61,320	I. 5.248
Bessemer pig	429,577	410,963	D. 18,614
Basic pig	6 371,993	7,032,322	I. 660.329
Steel pig	514,012	580.344	I. 66,332
Forge iron	932,679	976.986	I. 44 307
Scrap and cinder	13,661	15 446	I, 1 785
Total	10,058,273	10,875 061	I. 816,788

These figures differ slightly from those of the German Iron and Steel Union, published earlier in the year, but the difference is not important. The production of finished iron and steel was as follows:

	1904.	1905.	Changes.
Castings	1,879,879	2,045,477	I. 165,598
Wrought iron	778,122	787,277.	I. 9,155
Puddled steel	50 592	43,311	D. 7,281
Blooms, etc	2 373,967	2,725,498	I. 351,531
Finished steel	6,036,621	6,753,604	I. 716,983

The mining statement for the two years is as follows:

	1904.	1905.	Changes.
Coal	120,815,503	121,298.167	I. 482,664
Brown coal	48,635,080	52,498,507	I. 3,863,427
Total coal	169.450.583	173,796,674	I. 4,346,091
Iron ore	22,047,393	23,444,073	I. 1,396,680
Manganese ore.	52 886	51,463	D. 1,423

The small increase in coal was due to the miners' strike in the early part of 1905. The brown coal, or lignite, showed a fair increase.

Chemicals.

NEW YORK, July 3.

Copper Sulphate—Exports of copper sulphate from the United States in May were 1,452,540 lb. in 1905, and 6,457,397 lb. in 1906; an increase of 5,004,857 lb. The exports this year contained, approximately, 721 long tons of copper.

Business is fair, and prices unchanged at $6@6.25 per 100 lb., according to size and conditions of order.

Nitrate of Soda—Imports into the United States in May were 22,091 tons in 1905, and 37,093 tons in 1906; an increase of 15,002 tons this year.

The market continues strong, with quotations at 2.40c. for 96 per cent., and 2.32½ for 95 per cent.

Jackson Brothers report from Valparaiso, Chile, under date of May 26, that buyers are holding off, but sellers are firm at last quoted prices, 8s. 2½d. for 95 per cent. Sales reported are 462,000 quintals.

Phosphates—Exports of phosphates from the United States in May were 91,251 tons in 1905, and 85,959 tons in 1906; a decrease of 5292 tons. The chief exports this year were to Germany and Holland, 41,683; France, 11,050; Great Britain, 11,001; Italy, 10,494 tons.

Sulphur—Imports of brimstone, or sulphur, and of pyrites in May were, in long tons:

	1905.	1906.	Changes.
Sulphur	9,321	5,899	D. 3,422
Pyrites	38,525	54,479	I. 15,954

This shows a decrease of 36.8 per cent. in sulphur, but an increase of 41.4 per cent. in pyrite. The sulphur equivalent of all imports, this year was, approximately, 27,690 tons.

Heavy Chemicals—Imports of heavy chemicals in May were, in pounds:

	1905.	1906.	Changes.
Bleaching powder	10 807,593	7,676,947	D. 3,130,646
Potash salts	19,640.889	20,315,290	I. 674 401
Soda salts	2,186,769	2,017,328	D. 109,441

The decrease in bleaching powder for the month is in contrast to an increase shown in the earlier months of the year.

Metal Market.

New York, July 3.

Gold and Silver Exports and Imports.

At all United States Ports in May and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
May 1906	$5,716,898	$33,950,671	Imp. $28,233,773
" 1905	481,570	2 657 143	" 2,175,573
Year 1906	28,349,072	59,239,334	" 30,890,262
" 1905	35,800,708	14,460,402	Exp. 21,340,396
Silver:			
May 1906	5,544,546	4,370,788	Exp. 1,173,758
" 1905	5,426,590	3,742,113	" 1,684,477
Year 1906	28,923,841	19 844,412	" 9,079,429
" 1905	20,326,631	11,817,345	" 8,509,286

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending June 30, and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$ 3,500	$ 75,341	$1,188,828	$ 33,911
1906	5,738 021	44,766.634	31.003.965	1,062,114
1905	36,878.999	490,366	15,994,270	1,856,697
1904	63,679,762	3,518,570	20,560,179	450,886

Exports of gold for the week were to the West Indies; of silver, chiefly to London. Imports, both gold and silver, were from West Indies and Mexico.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending June 30, gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts	$1,120,869,000	$1,056,944,900
Deposits	1,166,038,900	1,049,617,000
Circulation	48,536,800	48,362,400
Specie	214,744,100	187,184,500
Legal tenders	88,424,500	87,275,500
Total Reserve	$303,168,600	$274,460,000
Legal requirements	291,509,725	262,404,250
Surplus reserve	$12,658,875	$12,055,750

Changes for the week this year were increases of $2,878,300 in legal tenders, $144,700 in deposits and $1,142,825 in surplus reserve; decreases of $813,400 in loans, $1,699,300 in specie and $108,700 in circulation.

The following table shows the specie holdings of the leading banks of the world.

	Gold.	Silver.	Total.
New York	.....	.....	$187,184,500
England	$187,837,510	.....	187,837,510
France	589,843,755	$213,602,925	803,446,680
Germany	191,195,000	63,730,000	254,925,000
Spain	75,740,000	123,950,000	199,690,000
Netherlands	27,613,500	29,220,500	56.834,000
Belgium	16,436,665	8,218,335	24,655,000
Italy	145,005,000	19,985,000	164,990,000
Russia	542,250,000	29,505,000	571,765,000
Austria	234,440,000	63,910,000	298,350,000
Sweden	19,885,000	.....	19,885,000

The returns of the associated banks of New York are of date June 30, and the others June 29. The foreign bank statements are from the *Commercial* and *Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to June 14:

	1905.	1906.	Changes.
India	£ 3,275,871	£ 9,063,613	I. £ 5,787,742
China	502,968	.....	D. 502 968
Straits	2,800	1,750	D. 1,050
Total	£ 3,781,639	£ 9,065,363	I. £ 5,283,724

Imports for the week were £10,000 from the West Indies, £342,000 in bars and £56,000 in Mexican dollars from New York; a total of £408,000. Exports were £345,500 in bars and £222,000 in Mexican dollars; a total of £567,500, all to India.

Indian exchange continues steady, the Council bills offered in London having been taken at 16d. per rupee. The fall in price of silver was followed by heavy buying for Indian accounts.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.50⅛	$0.52
Peruvian soles and Chilean	0.46¾	0.49⅛
Victoria sovereigns	4.85⅛	4.87⅛
Twenty francs	3.86	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	July.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
28	4.84⅛	65⅛	30 3/16	2	4.84⅛	65⅛	30 3/16
29	4.84⅛	65⅛	30 3/16	3	4.84⅛	64⅞	29 15/16
30	4.84⅛	65⅛	30 3/16	4	.....	....	....

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

June-July.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
28	18⅝ @18¾	18¼ @18½	81⅛	38¾	5.75	6.00 @6.05	5.85 @5.90
29	18⅛ @18¾	18¼ @18½	81 3/16	38¾	5.75	6.00	5.85
30	18⅛ @18¾	18¼ @18½	.....	38⅞	5.75	6.00	5.85
2	18⅛ @18⅝	18⅛ @18¾	81¼	39¼	5.75	5.97½	5.82½
3	18⅛ @18¾	18¼ @18⅝	81⅛	39¼	5.75	5.97½	5.82½
4	.....	.....	....	....	...	.....	.....

London quotations are per long ton (2,240 lb) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—The market continues very dull, and the business done has been small in amount. Sales have been made at slightly further concessions, especially in electrolytic. Lake remains about the same; there is less of this class of metal offered. However, the whole market is of only nominal character. Quotations at the close are 18½@18¾ for lake copper; 18⅛@18⅜ for electrolytic in ingots, cakes and wirebars; 18@18⅛ for casting copper.

The standard market has been quiet, but steady. An evening up of accounts has taken place, without affecting prices much, which close practically unchanged at £81 12s. 6d. for spot, £80 10s. for three months.

Statistics for the second half of June show an increase in the visible supplies of 700 tons.

Refined and manufactured sorts we quote: English tough, £87@£87 10s.; best selected, £88@89; strong sheets, £97.

Copper Exports and Imports—The exports of copper from the United States for the five months ending May 31 are reported as follows:

To:	1905.	1906.	Changes.
Great Britain	12,938	8,913	D. 4,025
Belgium	911	908	D. 3
France	13,783	15,389	I. 1,606
Italy	2,772	2,872	I. 100
Germany and Holland	39,383	45,686	I. 6 303
Russia	4,234	799	D. 3,435
Other Europe	4,309	5,206	I. 897
Canada	674	532	D. 142
China	20,718	1,200	D. 19,518
Other countries	5,047	55	D. 4,992
Total metal	104,769	81,560	D. 23,209
In ore and matte	2,353	2,893	I. 540
Total	107,122	84,453	D. 22,669

The decrease in the total was 21.2 per cent. The actual quantities of ore and

matte exported were 12,095 tons in 1905, and 21,492 tons in 1906; contents are estimated chiefly on the basis of values.

Imports of copper and copper material for the five months are reported as follows; the figures giving the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico	16,423	6,530	22,953
Canada	6,660	1,665	8,325
Great Britain	3,879	.....	3,879
Other countries	4,691	1,455	6,146
Total imports	31 653	9,650	41,203
Re-exports	136	....	136
Net imports	31,517	9,650	41 167
Net imports, 1905	27,151	7,117	34,268

The total increase in imports this year was 6899 tons, or 20.2 per cent. The actual tonnage of ores and matte from Mexico this year was 51,290; from Canada and Newfoundland, 14,701 tons.

The exports exceeded the net imports by 72,854 tons in 1905, and 43,286 tons in 1906; showing a decrease of 29,568 tons this year.

Tin—While some efforts have been made in London to infuse life into the market, it has not helped business in this country. The close in London is cabled at £179 5s. for spot, £175 10s. for three months. The ruling quotations here have followed the fluctuations in London, being at the close 39@39¼c. Statistics for June show a decrease in the visible supplies of 600 tons.

Imports of tin into the United States for the five months ending May 31 are reported as below, in long tons of 2240 lb. each:

	1905.	1906.	Changes.
Straits	9,885	6,564	D. 3,321
Australia	157	443	I. 286
Great Britain	7,070	11,510	I. 4,440
Holland	200	205	I. 3
Other Europe	394	776	I. 382
Other countries	18	30	I. 12
Total	15,354	19,526	I. 1,802

The increase in the total imports this year was 11.71 per cent.

Lead—The usual midsummer dullness has made itself felt in this metal. Prices are unchanged in this market, while in London the close is cabled at a slight advance, being £16 13s. 9d. for Spanish lead, £16 16s. 3d. for English lead.

Imports of lead into the United States for the five months ending May 31, with re-exports of foreign metal, are reported as follows, in short tons, of 2000 lb each:

	1905.	1906.	Changes.
Lead, metallic	2,341	4,180	I. 1,839
Lead in ores and base bullion	42,702	32,833	D. 9,869
Total imports	45,043	37,013	D. 8,030
Re-exports	29,746	19,973	D. 9,773
Net imports	15,297	17,040	I. 1,743

Of the lead imported this year 32,382 tons were from Mexico, and 2070 tons from Canada. There were 2360 tons imported from Europe. Exports of domestic lead were 113 tons in 1905, and 275 tons in 1906; an increase of 162 tons.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of June 16, that silver has been 13 reales per ounce. Exchange is 27.35 pesetas to £1. Pig lead has been 77.25 reales per quintal; equal, on current exchange, to £15 16s. 5d. per long ton f.o.b. Cartagena. Exports were 55 tons desilverized to Marseilles, and 1133 tons argentiferous lead to London.

Antimony—There is no change, the market remaining nominal, with no alteration in figures.

Imports of antimony into the United States for the five months ending May 31 were, in pounds:

	1905.	1906.	Changes.
Metal and regulus	1,518,397	3,236,590	I. 1,718,193
Antimony ore	1,100,337	616,336	D. 484,021

This shows a decrease of 44 per cent. in ore, but an increase of 111.8 per cent. in metal and regulus.

Spelter—Slightly more business has been doing at the lower prices, but the demand is not sufficient to improve the tendency. The close is weak at 5.82½ St. Louis, 5.97½ New York.

The London market has been steady throughout the week, and it closes at the last quotations, £27 for ordinaries and £27 5s. for special.

William Lanyon is building a new zinc smelter at Dearing in southern Kansas. The plant will comprise six blocks of furnaces, and is expected to begin operation early in the fall.

Exports of spelter from the United States for the five months ending May 31 were 1288 short tons in 1905, and 1832 tons in 1906; an increase of 544 tons. In April and May of this year 1859 tons of spelter were imported. Exports of zinc ore were 9678 tons in 1905, and 10,277 tons in 1906; an increase of 599 tons. Exports of zinc dross were 4792 short tons in 1906. This article was not separately reported last year.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of June 16, that for blende, the market is quiet, and many mines hold stocks without finding buyers unless they are willing to accept lower figures. Calamine is still bought at prices altogether out of proportion to the value of blende. Shipments for the week were 2400 tonsi blende and calamine to Antwerp.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars for Lasalle and Peru, in 600-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been as follows: Jan. 6, 1906, $8; Feb. 5, $7.75; May 18, $7.65; June 9, $7.75; June 18, $7.90; July 2, $7.75.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producers are 40@45c. per lb. for large orders according to size of order and terms. For small lots, 50@65c. is charged.

Imports of nickel ore and matte into the United States for the five months ending May 31 were 5581 tons in 1905, and 5705 tons in 1906; an increase of 124 tons. Exports of nickel, nickel oxide and nickel matte for the five months were 4,705,752 lb. in 1905, and 4,716,231 lb. in 1906; an increase of 10,479 lb. this year.

Platinum—Demand is strong and steady. Prices are unchanged, $26 per ounce in New York. From $20 to $23 per ounce is paid for scrap platinum.

Imports of platinum into the United States for the five months ending May 31 were 3267 lb. in 1905, and 5328 lb. in 1906; an increase of 2061 lb. this year.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 7s. 6d. per flask, but jobbers ask £7 10s. for moderate lots.

Exports of quicksilver from the United States for the five months ending May 31 were 538,577 lb. in 1905, and 252,902 lb. in 1906; a decrease of 285,675 lb. this year.

Aluminum—List prices of the chief maker are as follows, for ingots; No. 1, over 99 per cent. pure, 38c. per lb. in less than 10-lb. lots, 36c. in lots of 100 lb. up to one ton, and 35c. in ton lots; No. 2, over 90 per cent., 35c., 43c. and 33c., as above. Granulated metal is 1c. per lb. over price of ingots. Rolled sheets from 44c. up, according to size.

Exports of aluminum from the United States for the five months ending May 31 were valued at $66,972 in 1905, and $68,129 in 1906; an increase of $1157 this year.

Missouri Ore Market.

June 30

The highest price paid for zinc ore was $49 per ton, on an assay basis of $43 to $46 per ton of 60 per cent. zinc, averaging for all grades $44.20.

The highest price reported paid for lead was $78 per ton, a decided drop in this mineral, the average price of the week being $76.26.

For six months this year the average price of lead has been $76.44, and for six months of last year $57.16 per ton, an average increase of $19.28 per ton. The average price for zinc for six months of

1906 is $43.28, against an average for the first half of 1905 of $44.45, a decrease of $1.17 per ton.

Following are the shipments of zinc and lead from the various camps of the district for the week ended today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,206,650	272,730	$53,325
Carterville-Webb City	1,974,340	356,710	57,976
Galena-Empire	934,840	115,130	24,475
Duenweg	512,400	135,660	16,693
Neck City	667,140	.....	15,677
Badger	552,900	1,460	13,334
Aurora	601,870	.....	11,505
Alba	429,340	.....	10,089
Prosperity	282,880	64,750	8,869
Granby	440,000	31,000	8,050
Oronogo	310,790	26,240	7,802
Sherwood	122,880	9,330	3,300
Spurgeon	180,440	14,900	2,964
Baxter Springs	133,590	.....	2,672
Cave Springs	67,980	.....	1,427
Wentworth	62,000	.....	1,395
Reeds	35,020	.....	787
Totals	9,517,060	1,027,940	$250,340
Six months	271,021,440	37,534,090	$7,300,082
Six months, 1905	251,604,680	30,426 010	6,462,425

Zinc value, the week, $211,136; 6 months, $5,865,497.
Lead value, the week, 39,204; 6 months, 1,434,585.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58 00	75.13
May	43.31	40.51	May	58 27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	....	July	58.00	....
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Conditions were favorable the first of the year for exceptionally strong zinc prices, but antagonizing the smelters on the tariff caused them to form an alliance in self protection, which alliance was the means of lowering prices below what zinc ore should have brought with the open competitive conditions of last year. Recent events in the Joplin ore market are strongly indicative that the pool has disorganized, having accomplished all that was desired in lowering prices $10 per ton, from the price current when the reduction began. The past three weeks has demonstrated the advisability of the open competitive methods of last year. The reserve stock has been whittled down to less than 3000 tons, hot damp weather is creating bad air in the mines, and the usual midsummer slump in production was inaugurated tonight by a number of the larger mills being closed for one to two weeks of repairs, while the employes celebrate and take an outing.

The increase in shipment of the first half of 1906 over the first half of 1905 aggregates 19,416,760 lb. of zinc and 7,108,080 lb. of lead. The increase in zinc value is only $272,282, while that of lead is $564,875, a combined increase of $837,657. This ratio of increase continued will make gains of 18,000 tons of zinc, 7000 tons of lead and a million and a half dollars for 1906, over the totals of last year.

Wisconsin Ore Market.

PLATTEVILLE, June 30.

Advice of an impending break in the price of 60 per cent. zinc was received early in the week, when it was learned that the Joplin market was weakening. The cut, however, amounted to only $1 per ton. A larger part of the ore sold on a $45 basis, with the usual penalties for lower percentages and iron contents.

A sale of several carloads of roasted Empire ore was reported at top prices; before roasting, the ore was selling at $26; that sold this week averaged $45; one bin assayed 62.4 zinc and 2. 2 per cent. iron.

Prices of zinc ore ranged from $30 to $47 per ton. Lead $32.50 to $37 per 1000 lb. Sulphur $3 to $6. Drybone $4.50 to $19. The different camps loaded ore as follows for the week:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	269 400	.....	.....
Linden	283,620	.....	.....
Cuba City	213,380	.....	.....
Galena	142,770	40 000	.....
Rewey	110,000	.....	.....
Benton	108,100	.....	.....
Hazel Green-Buncombe	70,600	.....	.....
Mineral Point	67,720	.....	.....
Harker	62,440	.....	.....
Highland	60,000	.....	.....
Livingston	40,000	.....	.....
Total for week	1,377,980	40,000	.....
Year to June 30	33,634,700	1,870,070	3,199,980

The inclement weather had considerable to do with the loading of ore and quite a bit remains in the bins ready to be loaded. It is claimed by some that there is about as much left in the bins as has been loaded during the past two weeks.

Mining Stocks.

NEW YORK, July 3.

The stock markets generally have been weak and irregular, marked by a series of declines. Trading continues to be largely professional, and there has been heavy liquidation. Large sales were pressed, and the market was not ready to take the stocks, except at lower values. Thus Amalgamated Copper closed at $95¼; United States Steel at $33¼, with $99½ for the preferred. On the curb, Boston Consolidated was off to $24¾, and Utah Copper to $25½ per share.

It will be remembered that over a year ago the State of New York imposed a tax of 2c. per share on sales of stock. Heretofore this has been interpreted as 2c. for each $100 par value. Now, however, a new ruling has been made, to the effect that the tax is 2c. per share, irrespective of par value. This will put a heavy burden on many stocks. Thus on a sale of 100 shares Amalgamated Copper, par $10,000, the tax would be $2; on an equal amount of Anaconda, a $25 stock, it would be $8; on a $10,000 sale of a stock of $10 par value, the tax would amount to $20, while on $10,000 in shares of $1 par, it would be $200. As there are many mining stocks having par values from $25 down to $1, the tax will be a severe burden—almost prohibiting dealings in those of $10 or less. If this ruling stands, few sales of mining stocks may be expected in New York.

Boston. July 2.

The market for mining shares has been unsettled, as might be expected from the sharp decline which has been witnessed in the general stock market. During the last week, however, Lake Superior mining shares, as a rule have remained stationary, while the other classes have recorded declines. There has been an absence of buying or selling in the above named class of stocks. Take 20 of the leading copper stocks and they show an average decline of $16¼ from the high price of the year, or $101,232,750 in value. Montana properties are $53,929,000 below the high prices, the Lake properties $19,703,750, the Utahs $15,575,000 and the Mexican shares $2,025,000.

There was considerable offering of Utah Consolidated which yielded $3 to $52.25, but the price closed tonight $1 above this. North Butte fell $2 to $83.25, but recovered to $86.25, closing $2.25 below this. A factor in the North Butte trading is expectation that the next dividend will be increased. United Copper recovered to $64, but broke to $59, the same day, touching $53.75 today. The Butte Coalition Mining Company's 1,000,000 shares were regularly listed on the stock exchange Thursday, but trading in the stock has been much restricted since then. The stock is off $1.50 for the week to $29. Par value is $15. Copper Range closes $2 below a week ago at $69.25, Isle Royale is off $1 to $17, Old Dominion $1.50 to $36.50. Parrot $1.75 to $24.50, Victoria $1 to $7 and Winona $1 to $5. The latter company has levied an assessment of $2 in order to complete the shaft house at No. 4 and place the mine in a position to be a producer.

Colorado Springs. June 30.

The market in Cripple Creek shares on the Colorado Springs Mining Exchange has been more active during the past week than for several months, and a total of 125,000 shares changed hands today. Acacia has been unusually active owing to a reported rich strike on the Burns claim of that company. Jennie Sample has also been a very active trader.

San Francisco. June 28.

The market continues to show strength and activity in the Tonopah and other Nevada stocks, but the Comstocks are rather neglected. General conditions are improving, however, and the exchange shows more real business this week than at any time since the earthquake.

New Dividends.

Company	Payable.	Rate.	Amt.
American Cement	July 21	$0.30	$60,000
Elkton Con	June 28	0 00½	12,500
International Salt	Sept. 1	1.00	187,500
Mexican Con. M. & S.	July 25	0 50	120,000
New Century	July 2	0.01	1,500
New Idria Quicksilver	July 2	0.20	20,000
Nova Scotia Steel & Coal, pfd	July 14	2.00	20,600
Osceola Con	July 27	6.00	576,900
San Luis Mining	July 5	0.10	22,500
Tamarack	July 21	2.00	120 000
Tennessee	July 27	1.25	218,750
Tonopah of Nevada	July 21	0.35	350,000
United Copper	July 31	1.75	787,500
Work	July 7	0.01	15 000

Assessments.

Company.	Delinq.	Sale.	Amt.
Alpha Con., Nev.	July 10	July 31	$0.05
Gold Chest, Utah	July 14	Aug. 2	0.004
N. Y. Bonanza, Utah	July 7	July 28	0.03
Portland Park, Utah	July 9	July 30	0.01
Republican, Cal.	July 12	Aug. 7	0.07
Sister, Idaho	July 5	Aug. 4	0.005
South Columbus, Utah	July 14	Aug. 2	0.02
Zelbright, Cal.	July 20	Aug. 11	0 05

Tonopah Stocks

July 3

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	19.25	19.12½	19.12½
Tonopah Montana	2 70	2.65	2.67
Tonopah Extension	5 87½	4.75	5.12½
Tonopah Midway	2.10	2.10	2.10
Tonopah West End	2.50	2.50	2.50
Goldfield Mining Co.	.42	.42	.42
Jumbo Mining	1.25	1.22	1.22
Red Top	1.27	1.25	1.25
Sandstorm	.60	.59	.60
Montgomery Shoshone Cons	15.00	14.75	14.75
Eclipse-Bullfrog	.88	.88	.88
Denver-Bullfrog	1.40	1.35	1.35

St. Louis.

June 30.

Adams, $0.40—$0.25; American Nettie, $0.15—$0.12; Center Creek, $2.50—$2.20; Central Coal and Coke, $65 00—$63.25; Central Coal and Coke, pfd., $80.00—$78.00; Central Oil, $60.00—$55 00; Columbia, $5.00—$2.00; Con. Coal, $27.50—$21.50; Doe Run (old stock), $350.00—$300.00; Granite Bimetalic, $0.22—$0.20; St. Joe (old stock), $32.00—$30.00.

LONDON. (*By Cable.**)

July 3.

Dolores, £2 2s. 6d.; Stratton's Independence, £0 4s. 0d.; Camp Bird, £1 4s. 0d.; Esperanza, £3 18s. 9d.; Tomboy, £1 6s. 3d.; El Oro, £1 5s. 0d.; Orville, £0 17s. 6d.; Somera, £0 3s. 9d.; Utah Apex, £1 2s. 6d.

*Furnished by Hayden, Stone & Co., New York.

COLORADO SPRINGS.

June 30.

Name of Company.	High	Low	Clg	Sales
Acacia	15¾	13½	15	62 000
C. C. Con.	4¾	4⅜	4⅜	1,000
Doctor Jack Pot	7½	6½	7⅛	11,000
Elkton	43¾	43¾	43¾	5,000
El Paso	43	42	42	14.200
Findlay	74¾	73¾	74	9,200
Gold Dollar	8	7⅞	8	18,200
Gold Sovereign	5⅞	5½	5½	4,000
Isabella	23½	22	22½	16,500
Jennie Sample	10¾	10	10½	64,000
Mary McKinney	47	45	47	250
Portland	1.50	1.50	1.50	1,700
United Gold Mines	10	9¾	9¾	7,900
Vindicator	93	93	93	1,500
Work	11	10½	11	24.000

SAN FRANCISCO.

June 27

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.67	.65	.67	400
Caledonia	.33	.32	.33	1,600
Challar	.10	.07	.07	4 900
Con. Cal. & Va.	.72	.65	.65	2,000
Crown Point	.11	.11	11	500
Gould & Curry	.11	10	.10	200
Hale & Norcross	.89	.87	.89	700
Mexican	.64	.57	.57	1,000
Ophir	3.70	3.60	3.65	1,100
Overman	.07	.07	.07	100
Potosi	.06	.05	.05	2,900
Savage	.90	.80	.80	1,600
Sierra Nevada	.16	.16	.16	1,000
Standard Con.	2.00	2.00	2.00	
Bullfrog Mining	.36	.32	.36	6 300
Diamondfield	.34	.31	.34	6 500
Jim Butler	1.31½	1.25	1.25	2,500
Kendall	.55	.55	.55	2 300
MacNamara	.89	.79	.79	25,800
Manhattan Dexter	.50	.48	.49	11,200
North Star	.52	.40	.52	9 500
Original Bullfrog	.13	.13	.13	3,000
Tonopah Belmont	5.62½	5.50	5.50	600

STOCK QUOTATIONS.

NEW YORK.

Week June 26

Name of Company.	High	Low	Clg.	Sales
Amalgamated	100⅛	95⅜	95⅜	622.230
Anaconda	245	230	236	161,200
British Col. Copper	7⅛	6⅝	7	1,430
Butte Coalition	30	27⅛	27⅛	1,650
Cum. Ely Mining	6⅞	6⅜	6⅜	11,500
Greene Gold	3⅛	2⅞	2⅞	1,380
Greene Gold & Silver	2	1⅜	1⅜	2,825
Guanajuato	5⅜	5¾	5¼	1,500
Micmac	4⅜	4	4	4.680
Mines Co. of Am.	1.25	1.20	1.22	1,300
Mitchell Mining	6⅛	5¾	5¾	1,265
Mont. Sho. Con. (New)	15½	14⅜	14⅜	400
Nev. Utah M. & S.	3⅝	3	3⅜	4,900
Nipissing Mines	5⅜	5⅛	5⅛	10,600
Tennessee Copper	42⅛	41	41½	800
Union Copper	1¼	1⅛	1⅛	3,100
Utah Apex	5⅜	5⅛	5⅜	910

NEW YORK INDUSTRIALS.

Am. Smelting & Ref*.	147	140¾	141⅞	232,550
Am. Smelt. & Ref., Pf.	115⅛	114	114⅛	2,400
Bethlehem Steel	26½	26	26	500
Colo. Fuel & Iron	49¼	44¼	45¾	99,950
Federal M. & S., Pf*	95	92	93	3,200
Inter. Salt	33⅛	31⅛	32	760
National Lead*	73¾	71¼	72	26,240
National Lead, Pf	101	100⅜	101	325
Pittsburg Coal	13½	13½	13½	100
Republic I. & S.	27⅞	25¼	25⅞	8,500
Republic I. & S., Pf*	95	93⅛	94	5,800
Sloss-Sheffield	71⅛	69	69	5,390
Tenn. C. & I.	154	145	145⅛	2,540
U. S. Red. & Ref	38	33½	37⅛	3,600
U. S. Red. & Ref., Pf.	78	72	77⅛	3,500
U. S. Steel	36⅞	32⅞	33⅛	500,850
U. S. Steel, Pf.	103⅜	98⅛	99⅜	240,340
Va. Car. Chem	37	34	34⅛	5,476

* Ex. div.

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Atlanta, .18½—.17½; Bamb. D lamar, 7; Comstock, .17—.16; Gugg. Exp., 284½; St'd Oil, 603—593. (Boston) Ahmeek, 78—76; Ariz. Com'l, 41½—39½; Black Mt., 8¼—8; East Butte, 9¼—9; Keweenaw, 9; Superior & Pitts., 17½—16; Majestic, 1¾—1¼; Raven, 1¾—⅞; Shawmut, 1¼—1; Superior Cop. 13; Troy, 2¾—2

BOSTON.

Adventure	6¾	6¼	6⅜	557
Allouez	36	35	35¾	90
Atlantic	13	13	13	150
Bingham	28¼	27	27⅞	1,548
Boston Consolidated	25⅞	24	24½	4,335
*Calumet & Arizona	110	109	109½	225
*Calumet & Hecla	685	680	685	27
Centennial	21½	20	21	555
*Copper Range	71½	69	69	6,337
*Daly-West	15⅜	15	15½	450
Franklin	18¾	17	17	1,083
Granby	11	11	11	18
Greene Consolidated	25	24	24¼	2,495
Isle Royal	18	17	17	1,021
Mass	8	7⅞	7⅞	400
Michigan	11	10¾	10¾	600
Mohawk	61	59½	61	1,391
Mont. Coal & Coke rcts.	2½	2½	2½	130
Nevada	17½	16¾	16¾	970
*North Butte	86¼	83	84	10,763
Old Dominion	38	36½	36½	722
Osceola	109½	108	108½	1,629
*Parrot	26¼	24¼	24½	1,700
Quincy	94	93	93	45
Rhode Island	4¼	4	4¼	820
Shannon	8¾	8	8¼	6,323
Tamarack	98	97	98	55
Tecumseh	10½	10	10¾	700
Trinity	9	8	8	3,770
United Copper, com.	64¼	59	61⅞	6,490
U. S. Oil	10	9½	9¾	1,029
U. S. Smg. & Ref.	55¾	54¼	54⅜	615
U. S. Smg. & Ref., pfd.	46½	45	45	1,128
Utah Copper	55½	52¼	53¼	5,957
Victoria	8¼	7	7	355
Winona	6¼	5	5	436
Wolverine	138	137	138	93

PHILADELPHIA.

July 3.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7½	7⅛	7⅛	250
Cambria Steel	35¼	33¾	33¾	5,739
General Asphalt	9	9	9	120
Penn. Steel, pd.	106	106	106	
Philadelphia Co*	51	49¾	50	619
Tonopah Mining	19¼	18¾	18⅞	1,915

PITTSBURG.

July 3.

Crucible Steel	12¼	10	10	2,599
Crucible Steel, Pf.	76⅝	74½	74½	2 334
Harbison-Walker Ref.	10½	10¼	10¼	600
Ohio Tonopah	.28	.27	.27	3,800
Tonopah Ext.	5½	4	4¾	14,180

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.10-	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.97+	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	.....	27.163	.....
August	60.259	.....	27.822	.....
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.852	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	15.008	18.310	15.128	18.416	68.262	78.896
Feb	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83.994
July	14.888	.....	15.005	.....	66.887	.....
Aug	15.664	.....	15.725	.....	69.830	.....
Sept	15.965	.....	15.978	.....	69.667	.....
Oct	16.279	.....	16.392	.....	71.406	.....
Nov	16.599	.....	16.758	.....	74.727	.....
Dec	18.328	.....	18.398	.....	78.998	.....
Year	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	29.325	36.390	July	31.760	.....
Feb	29.202	36.403	August	32.866	.....
March	29.523	36.662	Sept	32.095	..
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	.....
June	30.329	39.260	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	4.552	5.600	July	4.524	.....
Feb	4.450	5.464	Aug	4.665	.....
March	4 470	5.350	Sept	4.850	.....
April	4.500	5.404	Oct	4.850	.....
May	4.500	5.685	Nov	5.200	.....
June	4.500	5.750	Dec	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922; April, £ 15.859; May, £ 16.725; June, £16.813.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	6.190	6.487	6.032	6.337	25.062	28.225
Feb	6.139	6.075	5.989	5.924	24.594	25.844
Mar	6.067	6.209	5.917	6.056	23.826	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5.948	23.875	27.406
July	5.396	.....	5.247	.....	22.938	.....
Aug	5.706	.....	5.556	.....	24.675	.....
Sept	5.887	.....	5.737	.....	26.375	.....
Oct	6.087	.....	5.934	.....	28.225	.....
Nov	6.145	.....	5.984	.....	28.500	.....
Dec	6.522	.....	6.374	.....	28.719	.....
Year	5.882	.....	5.730	.....	25.483	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

DIVIDENDS.

Metal and Mining Companies—U. S.

Name of Company and Location.		Authorized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,374,381	Feb. 1906	$ .30
Alaska Treadwell, g	Al'ka	5,000,000	200,000	25	8,535,000	Feb. 1906	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	.....	Feb. 1906	0.40
Amalgamated, c.	Mont	155,000,000	1,530,879	100	38,720,486	May 1906	1.75
Am. Sm. & Ref., com.	U. S.	50,000,000	500,000	100	7,625,000	July 1906	1.75
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	21,706,553	July 1906	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	765,000	Mar. 1906	1 50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	1,500,000	June 1906	1.25
Anaconda, c.	Mont	30,000,000	1,200,000	25	28,850,000	July 1906	1.37½
Annie Laurie, g.	Utah	5,000,000	25,000	100	455,061	July 1905	.50
Arizona, c.	Ariz	3,775 000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c.	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. s.	Mo	400,000	400,000	1	40,000	Dec. 1905	.01
Beck Tunnel, g. s. l.	Utah	1,000,000	1 0o0,000	1	130,000	May 1906	.02½
Boston & Montana.	Mont	3 750,000	150,000	25	45,275,000	Apr. 1906	3.00
Bunker Hill & Sull.	Ida	3,000,000	300 000	10	6,600,000	June 1906	.60
Butte & Boston, c.	Mont	2 500,000	200,000	25	1,800,000	Feb. 1904	1.00
Calumet & Arizonac	Ariz	2 500,000	200,000	10	4,500,000	June 1906	3.00
Calumet & Hecla, c.	Mich	2,500,000	100,000	25	94,350,000	June 1906	15.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	3,382,500	Feb. 1906	.24
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
C. K. & N., g	Colo.	1 500,000	1,431,900	1	229,104	Dec. 1904	.01
Con. Mercur, g.	Utah	1,000 000	1,000,000	1	1,155,000	June 1906	.02½
Continental, s. l.	Mo	550,000	22.000	25	154 000	Apr. 1906	.50
Copper Range Con.	Mich	38.500.000	383 781	100	2,448,100	July 1906	1.25
Creede United, g.	Colo	1,625,000	1,625,000	1	173,428	July 1905	.02
Cripple Creek Con. g	Colo	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,283,000	June 1906	.60
De Lamar, g. s.	Ida	400.000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250.000	1,250,000	1	21,875	July 1905	.01
Doe Run, l.	Mo	10,000,000	59,062	100	933,010	May 1906	.50
Elkton Con., g.	Colo	3.000,000	2,500.000	1	1,654 460	June 1906	.00½
El Paso, g.	Colo	2,500,000	2,450,000	1	997,750	June 1906	.01
Fed. Sm., com.	Idaho	10.000.000	60.000	100	1 208.750	June 1906	4.00
Federal Sm., pf.	Idaho	20,000 000	120,000	100	2,021,250	June 1906	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	275,000	Apr. 1906	.01
Gemini-Keystone	Utah	500,000	5 000	100	1,800,000	Apr. 1906	10.00
Gold King Con	Colo	5 750.370	5,750,370	1	1,407 504	May 1905	.01
Gold Sovereign	Colo	2,000.000	2,000,000	1	10.000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250,000	1	1,086,250	May 1906	.06
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250 000	1,000 .000	0.25	620,000	Apr. 1906	.02
Homestake, g.	S. D	21.840,000	218 400	100	14,770,150	June 1906	.50
HornSilver, g. s. c. s. l	Utah	10,000 000	400,000	25	5,482.000	June 1906	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	262,245	Aug. 1906	1.50
Iron Silver	Colo	10,000,000	500,000	20	3,600,000	Apr. 1906	.20
Jamison, g.	Cal	3,900 000	390,000	10	235,570	Apr. 1906	.03
Jerry Johnson.	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500.000	500 000	5	515.000	June 1906	.03
Liberty Bell, g. s.	Colo	700.000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Mammoth, g. s. l.	Utah	10,000 000	400,000	25	2,020 000	June 1906	.05
Mary McKinney, g.	Colo	1.000,000	1,000,000	1	606,000	Apr. 1906	.03
Mohawk, c.	Mich	2,500,000	100,000	25	500,000	July 1906	3 00
Mont. Ore Purch.	Mont	2,500 000	80,833	25	6,608 119	Apr. 1906	10.00
Monument, g.	Colo	300,000	300.000	1	27,124	Apr. 1905	.01
Nevada Keystone, g	Nevada	1,000,000	638 877	1	61,790	Feb. 1904	.03
New Century, s., l.	Mo	150,000	150,000	1	25 500	July 1906	.01
New Idria, q	Cal	500 000	100,000	5	840,000	July 1906	.20
New Jersey, z.	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte.	Mont	6,000,000	400,000	15	1,800,000	May 1906	2.00
North Star, g.	Cal	2,500.000	250,000	10	1,136 989	July 1906	.20
Northern Light, g. s.	Utah	2,000,000	400,000	5	20.000	Feb. 1904	.05
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,15[illegible]	101 150	1	10,506	Mar. 1906	.05
Ophir, g. s.	Nevada	302,40[illegible]	100,800	3	1.797.400	July 1904	.25
Osceola, c.	Mich	2,500.000	96.150	25	5,785 700	July 1906	6.00
Parrot, c, s.	Mont	2,300,000	229,850	10	6,520,337	June 1906	.25
Pennsylvania, g.	Cal	5,150,000	51,500	100	284.925	July 1905	.10
Penn-Wyoming	Wyo	10,000,000	0,000,000	1	50,000	July 1905	.01½
Platteville, l. z.	Wis	20 00	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo	3,000,000	1,000,000	1	7,117,086	Apr. 1906	.05
Quicksilver, pf.	Cal	4,500,000	43,000	100	1,931,411	May 1903	.50
Quilp, g	Wash	1 500 00	1.500.000	1	15 000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	15,720.000	Feb. 1906	5.00
Red Bird, g. s. c. l.	Mont	1,500,000	300,000	5	72.000	Dec. 1904	.01
Rob Roy, z.	Mo	15,00	15.000	1	9,600	May 1906	.03
Rocco Homest'k, l. s.	Nevada	300,00	300,000	1	112 000	Dec. 1905	.02
Sacramento, g, q.	Utah	6,000,00	1,000,000	1	235,000	June 1906	.00½
Salvator, g. s. l.	Utah	200 00	200,000	1	6.500	Aug. 1904	.01
St. Joseph, l.	Mo	20,000,00	1,000 000	10	4,658,357	June 1906	.15
Silver Hill, g. s.	Nevada	108,00	108 000	½	59.400	Feb. 1906	.05
Silver King, g. s. l.	Utah	3,000,00	150,000	20	10 225,000	May 1906	.33½
South Swansea, g. s.	Utah	300,00	300 000	1	170 500	Apr. 1904	.01
Spearfish, g.	S. D	1,500,00	1,500,000	1	165 500	Jan. 1905	.01½
Standard Con., g. s.	Cal	200,00	178,394	10	4,178,174	Feb. 1906	.10
Stratton's Independ	Colo	5.500.00	1,000.007	5	4 895.865	Apr. 1906	.12½
Tamarack, c	Mich	1.500.00	60,000	5	9 000,000	July 1906	2.00
Tennessee, c.	Tenn	5,000,00	175.000	25	875.000	July 1906	1.25
Tomboy, g. s.	Colo.	1,500,00	300,000	25	1,316 000	Dec. 1904	.24
Tonopah of Nev.	Nevada	1,000,00	1,000,000	1	1 950,000	July 1906	.35
Tonopah Ext'nsion	Nevada	1,000,00	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway	Nevada	1,000.00	1.000.000	1	200,000	July 1906	.05
Uncle Sam, g. s. l.	Utah	500.00	500.000	1	110 000	June 1906	.01
United Cop. Com.	Mont	75,000,00	450,000	100	2.812.500	July 1906	1.75
United, c. pf	Mont	5 000.00	50 000	100	1,200,000	May 1906	3.00
United, s. l., com	Mo	5,000,00	92,400	5	27,450	Oct. 1903	.05
United, s. l., pf	Mo	1.000.00	19 556	25	197,084	July 1905	.50
United, (Cripple C'k)	Colo	5,000,00	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,00	300 000	10	17,085.322	Dec. 1904	.75
Un. States, pf. g. s. c. l*	Utah	37 500,00	750,000	50	1,312,500	July 1906	.87½
Utah, g.	Utah	1,000 00	100,000	10	228 000	May 1906	.01
Utah Con., c.	Utah	1,500.00	300,000	5	5,136.000	July 1906	2.50
Victoria, Utah	Utah	250,00	250,000	1	47,000	May 1906	.05
Vindicator Con., g.	Colo	1.500.00	1.500,000	1	1.425,000	Apr. 1906	.03
Wolverine, c.	Mich	1,500,00	60,000	25	3,390,000	July 1906	8.00
Work, g.	Colo	1,500,00	1,500,000	1	15,000	May 1905	.00½
Yankee Con.	Utah	500,00	500,000	1	112 500	June 1906	.02½
Yellow Aster, g.	Cal	1,000,00	100,000	10	538,789	Feb. 1904	.15

*Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S	20,000,000	181,530	100	6,286,790	Apr. 1905	3.00
American Cement.	Pa.	2,000,000	200,000	10	948,000	July 1906	.30
American Coal.	Md	50,000	50,000	25	1,757,500	Mar. 1906	1.25
Associated Oil	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	525,000	Feb. 1906	1.75
Bon Air C. & I., pf.	Tenn	2,500,000	18,808	100	249,757	Oct. 1904	1.50
Cambria Steel	Pa.	50,000,000	900,000	50	10,500,000	Jan. 1906	.75
Caribou Oil	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	1,768,125	July 1906	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,218,750	July 1906	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C. & I.	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md	10,250,000	102,500	100	7,971,650	Feb. 1906	6.00
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	625,000	June 1906	1.50
Empire S. & I., pf.	N. J	5,000,000	23,700	1	535,500	Jan. 1906	1.50
Fairmont Coal,	W. Va.	12,000,000	120,000	100	840,000	Feb. 1906	2.00
Four Oil	Cal	500,000	300,000	1	105 406	July 1905	.01
General Chem. com.	U. S.	12,500,000	74,103	100	1,448,713	Mar. 1906	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	4,075,178	July 1906	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil	Cal	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	Cal	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	744,780	Sept 1906	1.00
Jeff & Cl'f C. & I., com	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I., pf	Pa.	1,500,000	15,000	100	788,000	Feb. 1906	2.50
Kern River Oil	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14,345,650	346,897	50	23,533,303	Nov. 1905	2.00
Maryland Coal, pf.	Md	2,000,000	18,850	100	1,442,560	June 1906	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,154,945	Jan. 1906	.97
Monte Cristo Oil	Cal	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	1,490 540	July 1906	1.00
National Lead, pf.	N. Y.	15,000,000	149,040	100	15,280,048	June 1906	1.75
Nat'l Steel & Wire, pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md	1,000,000	50,000	20	310,000	Nov. 1905	.40
Oil City Petroleum	Cal	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil	al	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt	Pa.	3,000,000	60,000	50	13,988,000	Oct. 1905	3.00
Penna. Steel	Pa.	25,000,000	168,214	100	5,849,497	Nov. 1905	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	370,000	May 1906	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	1,840 014	May 1906	3.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	562,750	Apr. 1906	2.50
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	2,674,000	Jan. 1906	1.75
Somerset Coal	Pa.	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil	U. S.	100,000,000	970,000	100	393.765.000	June 1906	9.00
Tenn. C. & I., com.	Tenn	22,553,600	225,536	100	2,455,383	Aug. 1906	1.00
Tenn. C. & I., pf	Tenn	248,000	2,480	100	370,170	Aug. 1906	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas.	Pa.	9,000,000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. Steel Corp., com.	U. S.	550,000,000	5,088,025	100	53,360,978	Dec. 1903	1.50
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	155,928,973	May 1906	1 75
Va. Carolina Ch., com.	U. S.	38,000,000	279,844	100	3,678,829	June 1906	1.25
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	10,740,869	July 1906	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s.	Mex	27,500	1,100	25	117,437	Jan. 1905	2.37
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	140 000	25	1,551,148	Apr. 1906	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1906	4.00
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	2,708,800	July 1904	.15
Esperanza, s. g.	Mex	2,275,000	455,000	5	2,667,599	Jan. 1906	2.62½
Granby Con.	B. C.	15,000,000	1,350,000	10	938,630	May 1906	.30
Greene Con., copper.	Mex	8,640,000	864,000	10	4,777,400	June 1906	.40
Greene Con., gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
Guanajuato	Mex	3,000,000	540,000	5	33,750	July 1906	.06½
Guggenheim Expl.	Mex	17,000,000	105,000	100	2,388,750	July 1906	1.75
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	432,000	Oct. 1905	.24
Mexican Coal & Coke	Mex	5,000,000	50,000	100	600.000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex		240,000		240,000	July 1906	.50
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,165,000	June 1906	.01½
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,107,500	Feb. 1906	.20
Nipissing, S. Co.	Ont.	12,000,000	1,200,000	5	180,000	July 1906	.15
North Star	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	50,000	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	2,000,000	10,300	100	329,600	July 1906	2.00
Penoles	Mex		3,399,800	...	59,375	July 1905	23.75
Reco, g. s. l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Slocan Star	B. C.	500,000	500,000	1	575,000	Dec. 1904	.06
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper	Mex	1,000,000	10,000	100	.....	July 1906	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.2
Tyee, c.	B. C.	940 000	180,000	5	136,800	Dec. 1904	.48